ANGLO-SOVIET JOURNAL

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AND BOOK REVIEWS, ETC.

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Organ of the Society for Cultural Relations with the USSR

EDUCATION IN THE SOVIET UNION 1936 & 1955

Shena D. Simon

IN 1936 I spent a month in Moscow studying the educational system under the control of the Municipal Council. It was part of a wider inquiry into municipal government in Moscow, made by a group, and we published the results on our return.* I was chiefly concerned with the administrative aspect of the educational system, but I visited various schools and technical institutes, and met teachers as well as muncipal officials.

What struck me most then was the passion for education which permeated all through society, the enthusiasm and devotion of teachers and administrators alike, the rapidity with which new schools were erected, and the acceptance of double shifts in schools rather than refuse places to children of school age.

In 1936 compulsory education started at eight and ended at fifteen. There were kindergartens for children between the ages of three and eight, some provided by factories, some by the local authority. There were not enough places to satisfy the demand. When children reached the compulsory age they attended " seven-year " or " ten-year " schools. Those who attended the former could go on to the latter at fifteen, but ten-year schools, where children spent their whole school life, were being built in large numbers and were expected to make the seven-year school obsolete before long.

At the end of the compulsory seven years' schooling, children had an examination. Those who passed well enough stayed on to qualify at eighteen for entry to the University, or to one or other of the institutions for higher education. Some of the rest entered " tekhnikums ", institutions which gave a two- or three-year highly specialised vocational course, and the rest went to work part-time and were employed only in light industries for short hours until they were sixteen. They attended factory schools. Co-education was the rule and all education in schools was free. Double shifts taught by separate staffs still existed, but the authorities were then looking forward to abolishing them during the course of the next five-year plan. The war prevented this target from being reached.

I was not then able to visit any of the special schools for handicapped children. During my visit the decree which abolished " pedology ", or intelligence testing, was promulgated, and its practitioners left the schools.† Russia was perhaps the first country to doubt the basis upon which current educational psychology rested; such doubts have since spread to other countries.

The war, with its incredible devastation of large parts of the Soviet Union, put an end to educational developments for a time, but by 1955 the effects in Moscow and Leningrad had been entirely obliterated, except that there was still a shortage of school places, so that two shifts existed in some of the schools.

By 1955 there had been certain changes in the system. Compulsory education now begins at seven and lasts until fourteen, and the ten-year school, which has superseded the seven-year school, ends at seventeen. Entry to the University and equivalent higher institutes starts at that age, and these courses

* *Moscow in the Making*, E. D. Simon and others.

† See *Why Soviet Teachers Oppose Intelligence Testing*, in ANGLO-SOVIET JOURNAL, Vol. XIV, No. 1 (Spring 1953).

last for five years. Now comparatively few children in the towns leave school at the end of the compulsory age, and a diminishing number enter tekhnikums or industrial schools. Tekhnikums are being transformed, from places where a three- or four-year course was given to children who had had only seven years of general education, into places where a two- or three-year course is given to young people who have completed a full secondary course ending at seventeen. The reason for the change is interesting, and especially so to those of us in England who are faced with similar problems of technical education. Those in control of industry in the Soviet Union complained that the entrants, who had had a specialised vocational training superimposed upon only seven years of general education, were not proving satisfactory recruits, and they demanded a full ten years of general education as the basis for specialisation. In this country we hear complaints from industry about the lack of a good educational background at fifteen and sixteen.

Another reason for the postponement of vocational training in Russia is the desire to have workers who are adaptable to the rapid changes of technique characteristic of modern society, and who are not therefore destined to be confined to one occupation for the whole of their working life.

Since 1936 other changes had been introduced into the educational system. Just before the war fees were imposed for classes 9 and 10 of the ten-year school—those above the compulsory leaving age—and during the war co-education was abolished in the largest cities.

To take the latter first, the change was introduced by a Minister of Education who thought that manly characteristics, so essential in war, might be endangered if boys were educated with girls. Segregation was never enforced in the country schools, or in smaller towns, probably because of the administrative difficulties, and it did not long survive the end of the war in the big cities. By 1955 the segregation was ending. It was only in the class 10 that we found a single sex, as it had not been considered good to move those pupils who were just preparing for their final examination. The move to separate the sexes was so alien to the whole philosophy of communism, in which the equality of the sexes was a vital principle, that it could not survive the special circumstances in which it was introduced. It was abolished as the result of protests in the press from parents, and its reversal was warmly welcomed by the teachers.*

Certainly all the teachers we met preferred to have both sexes to teach. Apparently, segregated education was never followed to its logical conclusion, i.e. special subjects for girls alone, such as domestic science and the care of infants. This distinction between the education of boys and girls did not exist in 1936, and does not exist today. Girls study exactly the same subjects as boys, and although some of them choose needlework as a "circle" (that is voluntary) activity after school hours, they could not choose cookery as there is no equipment for this purpose in the schools. Soviet women learn the necessary domestic arts apart from instruction in school.

It was not clear why fees were imposed in what correspond to our sixth forms, but the fees are small and there are many exemptions, such as orphan children whose fathers were killed in the war, those who do well in the examination at the end of the eighth year, and so on.

In one school I visited, forty per cent of the children in classes 9 and 10 paid fees. These will be abolished when education up to seventeen becomes compulsory.

Another change since 1936 is the existence of gold and silver medals awarded to those pupils who graduate from the ten-year school with the

* See *Life Says So!* in ANGLO-SOVIET JOURNAL, Vol. XV, No. 2 (Summer 1954).

highest marks. Formerly, the pupils who stayed on after the end of the compulsory school-leaving age entered the institutions of higher education, universities, and specialised institutes if they passed well enough in their final examinations. Now, only those who get a gold (" Excellent ") or silver (" Good ") medal pass in automatically. Those who get only a " Satisfactory " (or " Pass ") mark have to take the entrance examination of the particular institute. Each year 4,000 medals are awarded in Moscow and 1,700 in Leningrad, and honours boards bearing the names of the successful candidates are hung in the entrance halls of the schools. In 1936 I was told that entrance to Moscow University was about equivalent to London matriculation. In 1955 it has been raised and Moscow University can take only one in twenty of the applicants. As entrance to our universities has also been raised, it may be that the minimum qualification in both countries is still approximately the same. Perhaps the most striking feature of the present position is that plans have been made to introduce compulsory education up to seventeen throughout the whole of the RSFSR by 1960. In Moscow alone 400 new schools are to be built, which will not only accommodate the extra children, but will enable the shift system to be finally abolished. Plans have already been made for the number of extra teachers, and places in the universities and higher institutions are to be increased by forty per cent to accommodate the expected increase in students.

Polytechnical Education

In 1936 and earlier this aspect of education had been discussed, but not put into practice. Russian education had, by tradition, been more purely academic than had ours, and practical work in schools, even as an educational technique, had barely existed. Having read about polytechnical education in the Soviet Union, I asked at each school I visited if I could see the rooms for practical work. They existed, but few of them had any equipment for wood or metal work, and children in the primary classes, unlike our children in junior schools, did no handwork. That is all being changed now. The conception of polytechnical education is that all young people, whatever their adult work or profession may be, should, during their school life, get some understanding of the fundamental processes of industrial and agricultural production. It is believed that this is essential for a fully educated citizen in the modern technological age, and it also has the advantage of enabling young people starting post-school courses to make a choice between pure science at the University and applied science at a technical institute, based on a sounder knowledge than would otherwise be the case. Much research is at present being carried out into the best ways by which this education can be given in the schools. It involves discovering the best method of teaching the practical applications of theoretical knowledge, including the use of tools.

The increase in educational research since 1936, and especially since the war, cannot but strike a visitor. The sister Academies of Pedagogical Sciences in Moscow and Leningrad co-ordinate the work done by the individual institutes, which are again sub-divided into departments. For instance, the Institute of Methods, under the Moscow Academy, has five departments: mathematics and physical sciences; natural sciences; county schools and evening schools for young workers; polytechnical education; and the general principles of teaching. Certain schools are attached to the Institute, and the research workers from the Institute, together with practising teachers who are working for higher degrees, follow out their research in these schools. The schools selected for this experimental work are normal ten-year schools, but they are staffed more generously than the average, and have priority in receiving the equipment which will eventually be provided for all the schools.

In the experimental schools, problems of the curricula are studied, and text books tried out for later adoption by the Ministry for general use. These institutes also produce books and pamphlets for the use of teachers in the various subjects. The work is divided among the departments, but the Department of Methods carries out the fundamental research into the content of education and the methods involved in teaching the separate subjects at different age levels.

Another of the institutes is concerned with educational psychology. This deals with the psychology of the process of learning, and with the development of the child's personality as a whole, including his desire for knowledge. During the last thirty years the work has greatly developed, and on the basis of Pavlov's teaching much has been discovered about the way in which children acquire knowledge.* The present concern with the problem of polytechnical education has meant that much research is being concentrated on the inter-relations between the spoken word and the mastery of practical skills.

Another institute deals with problems of handicapped children,† another with improving the qualifications of teachers. There is no space in which to describe all the separate institutes with their departments, but there will be special interest in England in the work done on the problem of the backward child. In some cases it is found that since many children have attended kindergartens and have learnt habits of work, or come from families where it is natural for parents to teach them the elements of the three Rs, teachers of class 1 had assumed such knowledge to be general; and steps had to be taken to give special teaching to enable all children to benefit by the class instruction.

In other cases it was found that children who were backward in reading and arithmetic were not so through incapacity, but from a lack of desire to learn. These children were therefore encouraged to want to learn by various small prizes; for example, pictures were given to them if they could read the word underneath. Extra help after school was provided by the teacher, and the public opinion of the class as a whole that they should learn and catch up with the others was found to be a strong incentive. Interest and a desire to learn are thus created. This is only an example of the responsibility put upon teachers for bringing children up to the standard of the class, a responsibility which extends all through the school life, and is exercised also in the voluntary organisations of " circles " held after school and supervised by the teachers.

Children do not move up the classes automatically, but only when they have reached the required standard. An extra year in the same class is usually sufficient, hardly any having to spend longer.

The most obvious difference in the educational life of Moscow since 1936 is of course the magnificent new building of the university. Situated on a commanding site of over 300 hectares on the outskirts of the city, this building was begun in 1949 and finished in 1953. Ten thousand work-people were concentrated on the work. It accommodates all the science faculties, the arts faculties being left temporarily in the old building in the heart of the city.‡

Of the total of 16,000 university students, 9,000 are accommodated in the new building, and 6,500 of them are residents there. The students' hostels are part of the main building, but are self-contained, with canteens, common-

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* See *The Nature and Formation of Human Psychic Qualities and Processes,* in SOVIET PSYCHOLOGY BULLETIN, Vol. II, No. 1. *The Physiology of the Development of Speech in Children,* ibid, Vol. II, No. 2. *The Development of the Sensations in Children,* in SOVIET EDUCATION BULLETIN, Vol. I, No. 1 (O.P., available for reference).

† See SOVIET EDUCATION BULLETIN, Vol. II, Nos. 1, 2 *and* 3: *Special Schools for the Deaf and Hard of Hearing, for Mentally Retarded Children, for the Blind.*

‡ See *Moscow University's 200 Years,* in ANGLO-SOVIET JOURNAL, Vol. XVI, No. 1 (Spring 1955).

rooms and kitchens, as well as bed-sitting-rooms. These are more lavish than any provided for students in our hostels. First-year students share a bed-sitting-room, and with two more share a shower, washing-basin, lavatory and fitted wardrobes. After the first year each student has his own bed-sitting-room and shares the sanitary accommodation with one other in the adjoining room. The rooms are small and could not hold many friends, but the common-room and the wide corridors with tables and newspapers meet this need. A hall for students' dances, a concert hall, a swimming bath, and accommodation for indoor sports such as basket-ball, appeared to have been planned for larger numbers than are at present using them. We were told that there is room for 12,000 students in this building. The next step will be to build for the arts faculties and move them from the city, and later on to house the various higher institutes, many of which are badly housed at present. A separate block of 800 flats provides for some of the staff, as do 200 flats in the main building. Whatever one may think of the skyscraper type of building modified by the Russian affection for Gothic decoration, this fine building dominates the landscape, and, floodlit at night, was our delegation's first sight of Moscow as we were driving from the airport. It seemed symbolic of the importance the Soviet Union attaches to education.

I have described some of the differences between pre-war and post-war Soviet education, and some of the plans for the next five years. All of these show great advances on the position in 1936. But there is one striking similarity, the same passionate belief in education as the foundation of the socialist State, which, after the interruption of the war years, is being built with redoubled energy and enthusiasm. The war proved that the foundation had been truly laid, and the national confidence resulting from victory cannot fail to be a factor in helping the further development of the Soviet Union's resources. However much, in the present unsettled state of the world, has to be spent on armaments, it does not seem to affect the amount spent on education. The Soviet people, looking far ahead, do not put their trust solely in "reeking tube and iron shard", but in the belief that "knowledge is power". They will, in the course of the next generation, have a more highly educated population than that of any other country.

The arrangements for children's leisure are on the same pattern as that of 1936, but have been much developed. There are now, as then, "circles" held after school hours and supervised by teachers where children can follow their choice of occupation. They can choose either a subject in the curriculum in which they have a special interest or any of the various activities such as practical work, music, puppetry, drawing, sport, chess, and so on. If they prefer they can follow the same activities in the Clubs of Pioneers, situated in each district of the city, or in clubs run by the trade unions to which their parents belong. Both in Moscow and in Leningrad there are central Pioneer Palaces, where the provision is on a more lavish scale. The Leningrad Palace has been opened since my previous visit and is housed in a former royal palace. It has 300 separate rooms, as well as large halls for dancing, and a planetarium. Teachers are in charge of all the activities, which include individual learning of musical instruments and singing. These palaces are open all day and at weekends, so that children have a wide choice of leisure occupations outside their homes.

Some critics of Soviet education who object to the rigid curriculum of the ten-year school, in which there is no choice of subject, say that children's special abilities and aptitudes are not catered for. This is true, and reflects the Soviet belief that specialisation should not start until after ten years of a "common core". But these critics overlook the generous provision for out-of-school activities on a scale larger than anything that we provide here.

THE PROBLEM OF THE ORIGIN OF STARS

V. A. Ambartsumyan

Report read at the General Assembly of the USSR Academy of Sciences October 23, 1953

THE problem of the origin of stars is at present one of the central problems not only of astrophysics but of science in general. Its solution is closely bound up with study of the various physical states of matter in the universe, with the transition of matter from one state to another; and we are here speaking of more far-reaching transformations and changes of state in matter than those with which science has hitherto been concerned. In consequence, stellar cosmogony is a subject of extreme interest both to physicists and to philosophers; it demonstrates the depth and variety of the processes of development of matter.

Stellar cosmogony is, of course, and quite rightly, expected to help all those who are concerned with the difficult but exceedingly important question of the cosmogony of the solar system, since clarification of the general laws of the origin and development of stars will enable us to shed light on the history of the sun. Notable progress in research into the origin and development of stars has recently been made by Soviet science. Modern astrophysics has amassed an enormous amount of factual material on stars and stellar systems of a great variety of types and at different stages of development. This material, which shows us stars and stellar systems in an amazing multiplicity of states, has provided the basis for the progress made in stellar cosmogony. During the last five or six years, accumulation of observational data on stars and stellar systems has proceeded at an ever-increasing rate.

Detailed study of the spectra of bright stars has led to the conclusion that there is great variety in the structure and composition of stellar atmospheres. At the same time, it has been established that this variety is due not to one but to many empirical parameters, changing in some cases continuously and in other cases spasmodically, which considerably complicates the classification of stellar spectra today. New types of variable stars have been discovered which are of great interest. For example, in the case of the newly discovered class of variable star typified by U. V. Ceti, gigantic explosions changing the whole structure of the stellar atmosphere take place literally in a few minutes.

A great many different kinds of variable stars connected with diffuse nebulæ have been discovered. Thanks to the extensive investigations carried out at the Crimean Astrophysical Observatory by Academician G. A. Shain and V. F. Gazé, the study of diffuse nebulæ has been revolutionised. They have discovered a vast number of new diffuse nebulæ. The variety of forms existing among these is particularly well shown in the stellar charts produced by G. A. Shain and V. F. Gazé (1952) and V. G. Fesenkov (1953). The mass of a number of diffuse nebulæ has been determined.

No less interesting are the data on the polarisation of the general radiation of stars, a phenomenon discovered by V. A. Dombrovsky from observations made at the Byurakan Astrophysical Observatory in 1948. The material so

far accumulated on the degree and plane of polarisation of the radiation of a large number of stars indicates that this is a phenomenon connected mainly with processes taking place within the star itself and is only partially attributable to the influence of the inter-stellar medium. The greatest degree of polarisation so far observed is that found in super-giants, which are young stars.

A large amount of observational material on the multiplicity of states of star clusters and star associations has been collected.

A new department of astrophysics has come into being, devoted to the study of discrete sources of radio radiation lying both within and without the Galaxy. Gigantic interference radio-telescopes have been constructed to make study of these discrete sources possible. Discovery of monochromatic radio radiation by the Galaxy, with a wave-length of 21cm, has made possible a detailed study of the distribution of inter-stellar hydrogen in the most remote portions of the Galaxy. The problems of radio-astronomy are more and more becoming identified with the problem of cosmic rays and inter-stellar magnetic fields.

Soviet scientists have been most successful in systematising and interpreting the observational data provided by contemporary astrophysics, since their approach to the understanding of natural phenomena takes as its starting-point a materialist outlook based on the idea of development constantly taking place in all the forms in which matter exists in the universe.

The particular attention paid by Soviet astrophysicists to the discovery and detailed study of unstable or still unsettled states of stars, stellar systems and nebulæ (i.e. states connected with far-reaching changes at present taking place within these bodies) has to a considerable extent determined the progress made by Soviet stellar cosmogony.

Soviet astrophysicists now have good grounds for asserting that the process of star-formation is now going on within our stellar system. The incorrect idea, once generally accepted, that all the stars of the Galaxy were formed simultaneously at some distant epoch thousands of millions of years ago has been completely disproved by recent work carried out by Soviet astronomers, which has demonstrated facts proving that the process of star formation is still going on in the Galaxy. The ideas of Soviet scientists on star formation in the Galaxy have won general recognition today.

Another conclusion, of equal importance, based on the data of contemporary astrophysics, concerns the group nature of star formation, that is the fact that as a rule new stars do not appear singly, but in groups of several dozen or several hundred.

Of vital importance in providing a factual basis for these new hypotheses has been the establishment of the existence in the Galaxy of stellar systems whose total energy is positive. In the Galaxy, which comprises thousands of millions of stars, all the stars are found to rotate around the centre of gravity of the Galaxy. Each single star has a definite orbit, a definite path which it pursues as it moves around the centre of gravity of the Galaxy. In addition to single stars, there are large numbers of binary and multiple stars in the Galaxy, and also what are known as star clusters, which consist of a comparatively large number of units. The stars belonging to any one of these groupings (to a multiple system, for instance) are kept near to one another by mutual attraction. Each star belonging to such a grouping carries out two movements—one within the group, around the centre of gravity of the group, and the other (in company with the rest of the group in the general gravitational field of the Galaxy) around the centre of the Galaxy. These groupings are usually constant, in the sense that they can make one or several revolutions around the centre of the Galaxy without disintegrating.

It should here be noted that the time required for one revolution about the

centre of the Galaxy is, for stars in the neighbourhood of the sun, of the order of two hundred million years. The time required for one revolution around the centre of gravity of the group is only a fraction of this.

The relatively stable nature of the groupings under consideration is connected with the momenta of the stars in relation to the centre of their group, these being so small that the stars within the group cannot overcome the field of attraction of the group, cannot break away from the group, and so remain within it for quite a long time. Mathematically, the smallness of the velocities of the stars is expressed by the statement that the kinetic energy of the relative movement of all the stars of the group is less than the absolute magnitude of the energy of the mutual attraction of the stars within the whole system, i.e. the total energy of the system (the sum of its kinetic and its potential energy) is negative. Classic examples of such systems are Alpha Centauri (triple system), Alpha Geminorum (Castor, sextuple multiple system) and the Pleiades cluster (which contains several dozen stars). All these are stable systems whose total energy is negative. Stellar dynamics did not formerly pose the question of the existence of stellar systems or groups whose total energy was positive, i.e. of groups within which the momenta of the constituent stars were so great that they could move out of the system. Such systems would rapidly disintegrate owing to lack of sufficient force of mutual attraction. Strictly speaking, the sum total of stars found in any section of the Galaxy picked at random could be considered as a system whose total energy is positive. But such a grouping will quickly be dispersed in space, and it is therefore pointless to count chance groupings of stars as stellar systems. To astronomy and cosmogony the only question of interest is the possible existence of groups with a positive total energy whose members have a common origin.

It has been established by methods of stellar dynamics that the existing systems whose total energy is negative could not as a rule have been formed by the coming together of a number of stars previously independent of one another. Consequently, the stars making up such a group have a common origin. It is therefore quite natural to apply the term " stellar systems " only to groups having a common origin and occupying a definite and, relatively to the Galaxy, small portion of space. We are thus speaking of the possible existence of stellar groups occupying a small space, having a common origin, and at the same time having a positive total energy. Such groups may with reason certainly be called " systems ". In 1948, at the Byurakan Observatory, it was theoretically demonstrated for the first time that the so-called " stellar associations ", which are rarefied groups of stars forming part of our Galaxy or other galaxies, must be systems with a positive total energy.

In 1952 a work published by the Dutch astronomer V. Blaau concluded, on the basis of a determination of the movements of stars belonging to the Persei II association of hot giants, that the total energy of this group was positive and that this association was in fact a group of stars diverging in space from a comparatively small volume. This was subsequently demonstrated for the Cephei II association by B. Y. Markaryan and for a stellar association in Lacerta by Blaau and Morgan. A work recently published by H. F. Weaver adduces data obtained by determining radial velocities, and confirms that the total energy of a number of stellar associations is positive.

Any system whose energy is positive must very rapidly disintegrate and turn into a group of stars moving away from one another. Observations show that some, if not all, stellar associations are in fact such groups—of stars moving away from one another. It is therefore not difficult to calculate, from the speed of " spreading " and the diameter of the association, the time it has taken one group or another to spread to its present size from a small initial volume, i.e. to calculate the approximate age of a stellar association. This

will, at the same time, be the age of the stars forming the association, since a system of positive total energy cannot be formed from a system of negative energy; and it follows that the stars of any association originated together as groups of diverging stars. Thus it has been established that the age of the Persei II association is 1,300,000 years and the ages of other associations between 4,000,000 and 5,000,000 years. The insignificance of these ages compared with the average age of the Galaxy is evidence that stellar associations are groups of very young stars. Therefore, the positive total energy of the stellar associations is proof that star formation continues in the Galaxy even at its present stage of development.

The conclusion that the total energy of stellar associations is positive was reached at the time when the concept of stellar associations in general was being developed. With the ordinary open star clusters it was quite a different matter. The large number of open star clusters long known in the Galaxy was evidence of their relative stability and of the fact that their total energies were negative. It was difficult to assume that there could be such a large number of star clusters of recent origin in the Galaxy. As far as it is possible to judge from the internal movements observed within these formations, some star clusters are in fact stationary, consequently their energy is negative. In 1950, however, at the Byurakan Observatory, B. Y. Makaryan showed that the hypothesis that the total energies of open clusters of all types are negative was in contradiction to the statistical data on the distribution of clusters by types. These data show that the majority of star clusters where the brightest stars are very hot (type O clusters) cannot be considered stationary systems. From this the conclusion was drawn that most of these systems also are disintegrating very rapidly. A 1953 study of velocities in the type O cluster nearest to us, known as IC 2602, entirely confirmed this conclusion. This cluster is a group of diverging stars. The age of the group, on a preliminary estimate, is 300,000 years. In other words, the stars of this cluster are very young.

In 1949 Soviet astronomers turned their attention to the small number of systems, found among multiple stars in the Galaxy, reminiscent in certain peculiarities of relative position among their stars of the famous Trapezium of Orion. These multiple stars have been named "Trapezium-type multiple systems". In contradistinction to the ordinary multiple systems (such as, for instance, Alpha Centauri or Castor), where there is no doubt of their total energies being negative, we have no proof of the total energies being negative in the case of the Trapezium-type multiple systems. The connection between the Trapezium systems and stellar associations made it possible to put forward the hypothesis that some at least of the Trapezium-type systems are systems of positive total energy. The work done by P. P. Parenago at the Sternberg Astronomical Institute on numerous measurements of the Trapezium of Orion itself has confirmed that we are in fact here dealing with a group of diverging stars.

The sum total of all the data on the stellar systems forming part of the Galaxy, then, leads us to the following conclusion: stellar systems of positive total energy arise in the Galaxy as well as systems of negative total energy. While the systems of positive total energy rapidly disintegrate, however, the systems of negative total energy exist over a long period. Systems of negative energy therefore make up the majority of multiple systems and of open star clusters.

We observe far fewer systems of positive energy, since, although many of them come into existence in the Galaxy, they very quickly disintegrate. We can only observe them immediately after they have come into being. Thus the stars composing them must be very young.

What sort of stars make up systems of positive energy? Does the physical

state of these young stars distinguish them in any way from the rest of the stars in the Galaxy?

A very large percentage of the stars forming part of systems of positive energy are in states showing rapid changes in physical structure. They therefore belong to various categories of non-stationary stars.

In the so-called O associations and O clusters, we observe a large number of stars of very high luminosity—super-giants, radiating immense quantities of energy and ejecting large quantities of matter from their atmospheres. As V. A. Krat and D. Y. Martynov have shown, this emission of matter must result, apart from a rapid change in the mass of the star, in a change in its velocity of rotation and consequently in the whole of its internal structure. Works by Academician V. G. Fesenkov and A. G. Masevich trace the history of the changes taking place in stars as a result of their emission of mass. In other words, Fesenkov and Masevich have constructed a theory of the evolution of stars as a result of the emission of mass, a theory which forms a most important chapter in Soviet stellar cosmogony. According to this theory the force of emission lessens in course of time and the star passes into a stable state. It may therefore be said that the stars encountered in the O associations are in a still-unsettled state on account of their youth.

As for the so-called T associations (associations, that is, consisting of dwarf stars, which have been studied in detail by P. N. Kholopov), the non-stationary character of the constituent stars is immediately noticeable. These are usually variable stars of the type of T Tauri (or of RW Aurigæ). Considerable and completely irregular variations in brightness characterise them. In the spectra of stars of the T Tauri type we observe bright lines caused by a number of chemical elements. From theoretical astrophysics we know this to be evidence of the presence around the star of a gaseous layer which has usually been formed as a result of the emission of matter.

A very vital characteristic of both O and T associations is the presence of a large proportion of double stars, and also the connection between such associations (especially T associations) and diffuse nebulæ.

The comparatively high percentage of double stars in the associations compared with the general galactic field indicates that some of these pairs of stars must have split up after leaving the association. It is therefore very interesting to elucidate whether or not some of the widely separated pairs of stars forming part of associations or other stellar groupings are systems of positive energy. The theory of stellar associations thus assumes the existence of pairs of stars with positive energy, i.e. divergent stars.

Study of the connection between the associations and diffuse nebulæ is closely bound up with further elucidation of the nature of the bodies from which various stellar groupings—associations, clusters, multiple systems—are formed.

The observed radial expansion of some stellar groupings points to their common origin from bodies of another (non-stellar) physical nature, whose dimensions must be less than those of the associations. These bodies have been called proto-stars. The observed expansion of the cluster IC 2602 confirms that the proto-stars are much smaller in dimension than the O clusters. It must not be supposed that proto-stars are identical with diffuse nebulæ, since the volumes of some diffuse nebulæ are very great.

From this point of view the studies of gaseous nebulæ carried out at the Crimean Observatory by G. A. Shain and V. F. Gazé are of immense value.

It is well known that gaseous nebulæ are often found together with groups of hot giants. No direct conclusion as to their close evolutionary connection, however, can be drawn from this. The question is more complicated, since gaseous nebulæ, to be discovered, must be luminous, and the usual mechanism bringing about their luminescence is, of course, excitation of the atoms of the

nebula by radiation from hot stars of the O and BO types. We may therefore put forward the hypothesis that there are very many nebulæ in the Galaxy, but that we only observe a sufficiently intense luminescence from them in cases where there are O or BO type stars in or near them. Various statistical considerations, as well as the existence in space of non-luminous gaseous clouds and of groups of hot giants (for instance the Persei I association) with no apparent connection with the large gaseous nebulæ, would seem to be evidence of the absence of any direct genetic link between the nebulæ and the hot giants which excite their luminescence. Investigations carried on at the Crimean Astrophysical Observatory, however, have yielded data making it possible to shed new light on this question. A series of gaseous diffuse nebulæ of round or oval form (peripheral structure) has been discovered, and there are usually groups of hot giants in the central part of these structures. There are nebulæ of peripheral structure, for instance, in the Monoceros II association, Cassiopeia VI, and around the Labda chain of Orion. Diffuse nebulæ of this sort were subsequently discovered by other observatories, particularly in the southern sky, in the Scorpio I association around the cluster NGC 6231, which contains a considerable number of super-giants, and around the remarkable pair of stars Gamma Vela.

It only remained for a conclusion to be drawn as to the genetic connection between nebulæ and groups of hot giants. The conclusion reached by G. A. Shain has quite recently been confirmed by the following fact, which is worthy of special attention.

I have already mentioned V. Blaau's discovery of the radial divergence of the stars in the Persei II association. The linear velocity of the stars away from the centre of the association is twelve kilometres per second, but the velocity of one of the stars of this association reaches fifty kilometres per second. This star is Xi Persei, of spectral type O. Alongside it is the large gaseous nebula NGC 1499. This nebula proves to be moving away from the centre of the association at a velocity of the same order. In this case no doubt arises as to the common origin of the nebula and of the stars. Moreover, it is obvious that both were formed along with the whole of the stellar group Persei II. It would appear that we have a similar picture in the case of the star AE Aurigæ, which is a type O star and connected with nebula IC 405.

At present, then, there can be no doubt of the genetic connection (in some definite instances at least) between gaseous nebulæ and the stars which kindle them. This being so, three possible forms for such a connection must be considered: the formation of nebulæ by the ejection of matter from the atmospheres of giant stars, i.e. the formation of nebulæ from stars; the formation of stars from nebulæ; and finally the simultaneous origin of stars and nebulæ from bodies of another nature.

The first possibility is hardly acceptable, since the mass of gaseous nebulæ is sometimes very great and apparently would in some cases exceed the total mass of the stars connected with them. A great many calculations of the approximate mass of gaseous nebulæ have recently been made by G. A. Shain and V. A. Vorontsov-Velyaminov. According to Shain's calculations, the masses of the gaseous nebulæ situated in some of the outer galaxies reach figures tens of thousands of times as great as that of the sun. Even assuming errors in calculation, it is still clear that the masses of certain nebulæ are thousands of times the mass of the sun. Such masses could scarcely be formed through the emission of matter by comparatively limited groups of hot giants. Moreover, in some individual nebulæ, also of peripheral structure, we do not observe hot giants or in general any stars emitting matter.

The second possibility, i.e. the hypothesis of stars being formed from nebulæ, is at present very popular. It is, however, contradicted by the exist-

ence of the Persei I association, for instance, around the double cluster Chi and h Persei, where there is very little gaseous matter and a great many stars of quite recent origin.

The explanation put forward by G. A. Shain, that the peripheral structure of certain diffuse nebulæ is due to expansion of the original gaseous mass from a definite and comparatively small volume, is a most simple and natural one from a theoretical point of view. No other explanation has so far been advanced. Moreover, this concept is supported by observational data concerning the fibrous nebula NGC 6960—6995, in Cygnus. From this it follows that peripheral diffuse nebulæ cannot be much older than the stars with which they are genetically connected. There is theoretical foundation for saying that in general the diffuse nebulæ known to us are young objects; they cannot be stable but must be changing state rapidly. If, then, we admit that the stellar form of the existence of matter may be preceded by the nebular form, inevitably we must also admit the existence of yet another stage, from which arises the nebular stage which will later pass into the stellar stage.

The supposition that this intermediate and indeed "nebulous" stage exists becomes rather artificial, however, and by and large we are obliged to pass on to the third possibility mentioned above, the simultaneous formation of stars and nebulæ from bodies of another nature.

The data on stellar associations, and particularly on the multiple systems of Trapezium type found within them, indicate that the origin of groups of stars is, in some cases at least, a process taking place within an area very small compared with that of a diffuse nebula. The density within this area before the formation of the stellar group must be very great compared with the average density of diffuse nebulæ. This too confirms the thesis that stellar groups arise from bodies differing from diffuse nebulæ in nature.

Many other facts relating to the abundance of multiple systems in the Galaxy also point in this direction.

Although this question still awaits final solution, then, the hypothesis of the simultaneous origin of stellar groups and diffuse nebulæ must be considered the most probable.

Academician V. G. Fesenkov, in studying the structure of diffuse nebulæ with the aid of a twenty-inch Maksutov camera in the Kazakh Academy of Sciences observatory at Alma-Ata, came to the conclusion that in certain separate filaments of fibrous nebulæ there are chains or paths of stars. These paths are not to be confused with the chains of hot giants occurring in some associations and clusters. If we admit the reality of these paths in the filaments, then we are again obliged, in order to explain them, to advance the hypothesis of the simultaneous origin of the path of stars and the filament, since the mass of the filaments as calculated by methods now available is many times less than the mass of the sun, and it cannot be supposed that the stars were formed from the matter of the filament itself.

The question then arises of the nature of the bodies from which the stellar groups originate. It must be admitted that we know very little as yet either of the nature of proto-stars or of the mechanism of the formation of stellar groups from them. Admittedly, astronomers have already come to the conclusion, on the basis of observed data, that, apart from stars and nebulæ, bodies of another nature, such as for instance the so-called "globules", exist in the Galaxy. These dark bodies, with diameters of the order of tenths of a parsec, are discovered as a result of the screening effect they have on the light of stars and nebulæ. They are often found in areas where there are gas clouds. It would be too bold an assumption as yet to identify the globules with the proto-stars we have mentioned. It is difficult to find any basis for the hypotheses put forward by some authors outside the Soviet Union concerning the

formation of these globules from clouds of gas and dust as a result of condensation of matter, and their later transformation into separate stars by further concentration. I have mentioned the globules only as an example of objects differing both from stars and from gas clouds but probably of considerable mass. Another example of objects other than ordinary stars and ordinary nebulæ is provided by the new type of object discovered in the constellation of Orion by the Mexican astronomer G. Jaro, working at the Tonantzitl Observatory.

All the cases of group formation of stars mentioned above relate to the origin of stars of two categories: those of the first are concentrated around the plane of the Galaxy, or, as it is sometimes put, from a flat sub-system within the Galaxy; those of the second show a moderate concentration around the plane of the Galaxy, or, in other words, form a sub-system of intermediate type. Clearly the results expounded above are inapplicable to those physical types of star found at great distances from the plane of the Galaxy, forming the so-called spherical sub-systems. Our conclusions are inapplicable, for instance, when it comes to problems of the origin of planetary nebulæ or short-period Cepheid variables. Study of differences in the nature of the process of formation of different categories of stars, and of their origin and development, is closely bound up not only with questions concerning the development of star clusters and other stellar groupings, but with questions of the development of entire galaxies.

As B. V. Kukarkin's researches have shown, our Galaxy consists of a number of interpenetrating sub-systems of stars of various physical types. The majority of these sub-systems can be assigned to one of the following types: flat, intermediate or spherical. These typifying adjectives characterise the spatial distribution of the stars in the sub-system referred to, relatively to the degree of flattening of the whole. In our Galaxy, sub-systems of all three types are found together. It is a characteristic of some outer galaxies that stars exist in them which broadly speaking form sub-systems either exclusively spherical or mainly flat.

In the elliptical galaxies there is an almost complete absence of the objects which usually form flat sub-systems. This means that in the elliptical galaxies the following are non-existent or very rare : super-giants, hot giants, diffuse nebulæ, open star-clusters and classical Cepheid variables. On the other hand, there is a relatively large number of sub-dwarfs and short-period Cepheid variables.

At one time it was erroneously held that the elliptical galaxies consisted not of stars but of diffuse matter, hence Jeans's hypothesis that in course of time elliptical galaxies turned into spiral ones. In 1946, however, V. Baade showed that the elliptical galaxies are made up of stars of the kinds forming the spherical sub-systems of our Galaxy. It was also shown that there is practically no diffuse matter in elliptical nebulæ. Large quantities of it are, however, observed in spirals of late types and in galaxies of the type of the Great Magellan's Cloud.

After the discovery of these facts the supporters of the theory that diffuse matter gives direct rise to stars put forward an exactly contrary hypothesis to the effect that in course of time spiral galaxies turned into elliptical ones. They believe that the diffuse matter present in spiral nebulæ gradually turns into stars, an important part in this process being played by the mechanism of accretion, i.e. the absorption of diffuse matter by the stars. All the stars making up elliptical galaxies, globular clusters and spherical sub-systems in general are thus old stars. The concept of the great age of all the stars of spherical sub-systems was expressed in very definite form by V. Baade during the discussion on questions of stellar evolution at the International Astronomical Congress in 1952.

It is hard to agree with such a proposition. If we assume that diffuse matter gives rise to stars, then, since this matter forms a flat sub-system in the Galaxy, the stars thus formed would, according to the factual data, have to be representative of flat and intermediate sub-systems.

The flat and intermediate sub-systems in the Galaxy would thus have to be enriched by more and still more stars. These ever-increasing flat and intermediate sub-systems could not disappear or turn into spherical sub-systems, even though the stars in them might evolve. Consequently, if elliptical galaxies arise out of spiral galaxies, we should expect to observe a wealth of flat and intermediate sub-systems (without diffuse matter, it is true) in the elliptical galaxies. This is not so in fact.

In accordance with the factual data, which point to the differing physical natures of stars in the flat and spherical sub-systems respectively, another concept has arisen and is being developed in Soviet astrophysics, namely the concept of dissimilar lines of development of stars belonging to sub-systems of various types. According to this concept, the stars of flat sub-systems do not turn into stars of spherical sub-systems, or vice versa. They do not represent different stages in the same kind of stars; each of these types has its own independent line of development. From this viewpoint it is possible for there to be young stars among the stars of the spherical sub-systems just as there are among those of the flat sub-systems. This view of the relations existing between the lines of development of the stars of the various sub-systems fits in more with the concept of development moving from elliptical systems to spiral ones. One could indeed picture the stars of a spherical sub-system being formed first of all and creating an elliptical galaxy. Within the latter there would be proto-stars which had not yet turned into blue giants and diffuse matter and did not give off any appreciable amount of light. At some stage of development the proto-stars would begin to turn into stellar associations and nebulæ, and a spiral nebula would be formed.

This point of view, however, is still crude. It shows the influence of the naïve concept that galaxies can be reduced to a simple one-dimensional succession of forms as presented in Hubble's well-known classification.

Even a simple study of the luminosities of the outer galaxies makes it evident that galaxies of similar form often have entirely different luminosities. The luminosities of the elliptical galaxies, for instance, differ very markedly from one another. The reason for this is the varying absolute number of stars in the different galaxies. Thus we already have two independent characteristics: the place in Hubble's classification, and luminosity. Then we find that elliptical galaxies of similar luminosity, particularly elliptical galaxies of low luminosity, show varying degrees of concentration of stars towards the centre. Thus yet a third parameter appears.

Moreover, the latest data indicate that there are other no less important characteristics (frequency of flaring up of novæ and super-novæ, intensity of radio-wave radiation) which show the outer galaxies to be different from one another. What relations exist between all these parameters is not yet known, but that we have at least several independent parameters is beyond doubt. This means not only that the galaxies differ from one another in age, but that there are many differing lines of development, depending on what the primary state was; and to elucidate these lines of development a careful study of a large number of outer galaxies is required.

Meanwhile, the development of extra-galactic astronomy is noticeably behindhand here as compared with that in other branches of astronomy. In order to make progress in this field as great as we can show in that of galactic astronomy, we must devote more attention to the construction of large telescopes, both optical and radio.

The above ideas on possible laws of development of galaxies have been dealt with only in relation to the problem of the origin of stars. Once we have succeeded in establishing certain laws governing the origin of stars and groups of stars, there arises the question of the laws governing their further development.

Something has already been said above concerning the emission of matter from stars, an emission which causes a considerable change in their rotational momentum. According to the data of V. G. Fesenkov and A. G. Masevich, this emission of matter represents a most important evolutionary factor for stars of the main sequence on the "spectrum-luminosity" diagram*. Most of the stars of the flat and intermediate components of galaxies belong to this main sequence. As for the stars outside the main sequence (yellow and red giants and super-giants on the one hand and white dwarfs on the other), the question of the evolutionary rôle played by the respective states of these stars is not clear. It has been established, by the work done by Soviet astronomers, and also by the new research carried out by G. Nassau, that red super-giants originate in the same associations as hot giants. It is not clear, however, where the medium (in absolute size) giants come from. Nor is it clear how the classical Cepheid variables originate; these are super-giant stars of types F and G, which undergo periodic pulsations. Attempts to trace a connection between them and stellar associations, even if only in the remote past, have as yet produced no results.

It is a circumstance of great importance for a cosmogonic explanation of the Cepheid variables that there are very few binary stars among them. But super-giants of types F and G which show no variation in brilliance, i.e. which are in a static state, very often have satellites. Consideration of these two facts should help to throw light on the mechanism of the formation of binary stars.

A few words on white dwarfs; these are stars of small volume and immense density. In literature on the stars the idea is often canvassed that white dwarfs may be stars which have reached the end of the road in development. This statement is based on the preconceived idea that stars cool down as they grow older, having exhausted their sources of energy. Yet white dwarfs are found among the satellites of young stars, and in these cases there is no reason not to consider them young also. The evolutionary rôle of white dwarfs is thus still unclear.

It must be admitted that, in spite of all the progress made by Soviet astronomy, only the first steps towards a solution of the problems of the origin and development of stars have been taken. These first steps have made it possible to establish the following important theses: that the process of star formation continues in the Galaxy; that star formation has a group character; that there is a genetic connection between stars and diffuse nebulæ; that stars originate along the whole front of the main sequence in the "spectrum-luminosity" diagram. Much hard work lies ahead in solving a multitude of problems. One of the most important tasks is to elucidate the laws of the origin and development of stars as fully as possible, in order to advance towards a correct solution of problems of the origin of the planets on the basis of these laws, of available data on the ordering of the planetary system and of material knowledge of the earth. The conference on cosmogony held in Moscow in 1951, and the discussion on Academician O. Y. Schmidt's theory,† showed that Soviet planetary cosmogony is already making wide use of the data provided by stellar astronomy and of the first results of our work on stellar cosmogony.

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* The Russell diagram.—Editor.

† See *The Origin of the Earth*, in ANGLO-SOVIET JOURNAL, Vol. XIII, No. 3 (O.P., available for reference in the SCR library).

THREE DAYS IN THE KREMLIN

Introduction

LEADING people from factories, mines and scientific institutes met in the middle of May in the Great Kremlin Palace for an All-Union industrial conference, called by the Central Committee of the Soviet Communist Party and by the USSR Council of Ministers.

Ministers, academicians, worker-inventors, party officials, designers, mounted the platform to speak briefly of the achievements in their organisations and then turned to the criticism for which they had been invited to the Kremlin.

They all knew that the objectives of the fifth five-year plan would this year be not only fulfilled but over-fulfilled. They all knew that the output of heavy industry was three and a half times the pre-war figure, and that dozens of new light-industry factories had gone into production in the past few years. The main subject for discussion, however, was not the successes achieved.

How was a still more rapid increase to be ensured for the Soviet Union's vast industry? This was the subject common to all the speeches. For three days impassioned words resounded from the platform of the Kremlin Hall on the impediments to technical progress, and on the possibilities for growth inherent in the newest scientific discoveries and, in particular, in atomic energy.*

A spirit of justifiable self-dissatisfaction, of stern criticism and self-criticism, reigned in the Great Kremlin Hall, alongside a vital belief in the inexhaustibility of our potentialities. Anyone who was fortunate enough to be there will never forget those three moving days in the Kremlin. Below we publish a well-known writer's impressions.†

—NOVY MIR editorial note.

THE COUNTRY'S MASTERS

Vasily Azhayev

THE rain falls in sparkling silvery threads, streaked with sunshine. Rain and sun together make an extraordinarily gay and festive combination.

We are crowded in the lobby of the Great Kremlin Hall, waiting till we can emerge.

The eyes of all the delegates standing about are shining and their faces are alive—whether because of the spring rain or because they are in the Kremlin, which always has a holiday feeling about it, or because they can still hear the words of Nikita Sergeyevich Khrushchov's speech. Someone standing nearby says aloud what everyone is thinking.

"I've never heard people speak like that from the platform. Three thousand people, and talking to each of us as though to an intimate friend, and about important affairs of state."

We exchange glances with Georgi Nikolayevich Glebovsky, director of *Uralmash*,‡ and with Nikolai Ivanovich Lupandin, milling-machine operator from the Kharkov Tractor Works. We've got to know them during the three-day All-Union industrial conference, which has just finished.

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* See SOVIET SCIENCE BULLETIN, Vol. 2, No. 3.

† Vasily Azhayev is author of the best-selling novel *Far from Moscow* (available in English translation).

‡ Urals Heavy Machinery Works.

" You don't feel like leaving, do you?" smiled Glebovsky, screwing up his large and faintly puffy eyes behind their glasses. " We've got used to the Kremlin, feel at home here."

We decide to take a final stroll through the Kremlin's streets and squares, without going into the cathedrals and museums. They don't appeal to us for the moment. From where we stand, the streets on the other side of the Moskva River look unusual—strings of rain-washed roofs, fresh as paint.

" Why am I in such a good mood?" says Lupandin in surprise, gazing at me with his deep-set grey eyes. Nikolai Ivanovich has the fine face of a well-balanced man, confident of himself. The lock of dark hair on his forehead makes him look younger than his thirty-six years. He had seemed to me a sick man when I first met him, thin as a rake, with slightly sunken cheeks and dark shadows beneath his eyes. But he is cheerful, hale and hearty, tireless. It was just that he slept too little and hardly rested at all throughout the three days of the conference, doing his utmost not to waste a moment of his visit to Moscow. His leanness and gauntness reflected his restless character and stern principles.

I feel Lupandin looking at me again.

" If it isn't a secret, do tell me how your Batmanov's* keeping," he said. " I know he's a hero in literature. But he's based on a live person you seem to have worked with in the Far East. Where is he? Seen him lately?"

" Very lately ", I reply. " Today. At the conference."

" Oh, if only I'd known!" says Nikolai Ivanovich regretfully. " Well, how's he keeping? How's his private life? Has it worked out?"

I see that Batmanov interests Glebovsky too, and reply that the man generally known as Batmanov is fine, that he has two grandchildren and that he is now working in Moscow.

" Half a minute! How can he have any grandchildren?" says Lupandin, perplexed. " I remember very well. He had a son who died. And everything went wrong between him and his wife."

" Ah, but that was in the novel ", I laughed. " In fact he and his wife have had a very happy life together. His son didn't die. He never had a son. But he had, and has, two daughters who grew up, got married and presented ' Batmanov ' with a grandson and a granddaughter."

" There you are! Writers!" says Glebovsky, shaking his head. " Proper twisters."

" The characterisation was supposed to be composite ", I explain. " I took the family misfortunes from someone else I knew."

" I see we have to take the literary hero we like for what he is, without looking behind him ", meditates Glebovsky. " Otherwise it turns out there are about fifty heroes behind Batmanov, none of them looking a bit like him."

" What's Batmanov doing in Moscow?" asks Lupandin cautiously, ignoring Glebovsky's remarks.

" He's working in one of the Ministries, in charge of one of the big Boards. He's got over a dozen big construction jobs to supervise now, instead of just one."

Nikolai Ivanovich is displeased, even disappointed. " What on earth for, I ask you? A first-rate construction chief and they have to go and shove him away in an institution. That's just what happens to inventors: a chap learns to produce three or four hundred per cent over the target and right away he gets turned into a chief. No more inventor, only a fair-to-average chief. And people ask why advanced experience isn't widely disseminated!"

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* Batmanov: Chief of the construction site in Azhayev's *Far from Moscow ;* a much-beloved literary hero in the post-war period in the Soviet Union.

This particular question particularly concerns the Kharkovite. He had spoken about it at the conference. Lupandin himself hadn't been tempted by promotion and hadn't left his lathe. At present he is fulfilling his twenty-ninth annual norm for the five-year plan, and teaching youngsters his inventor's methods of work at the milling-machine. "You're right to convince people by your own example; but you're wrong about this Batmanov chap", objects Glebovsky after a pause.

"Wrong? Why? Fancy shoving a live-wire into an office! And Batmanov of all people!" Lupandin shakes a finger. "You know as well as I do what happens when more-dead-than-alive people sit in the same seats on a Board for years on end. A comrade from *Gosplan** came to our works not long ago. Not a bad chap. Supposed to be an engineer. But he was welded to his seat and rusted up with paper. He came to give us guidance, but our shops to him were like Tierra del Fuego to me, something quite extraordinary. When the big Ministries were split up, new people from the factories did get into the set-up, and that helped to clear the air quite noticeably. If there'd been more Batmanovs in the Ministries or in *Gosplan*, we wouldn't all have had to have such a slanging-match at the conference." Glebovsky looks at me. "Don't you agree?"

"Yes, in a general way. But I must say I'm sorry for our Batmanov.

"Aha!" says Lupandin joyfully.

"Sorry? Why?" asks Glebovsky. "On the construction sites he could feel he was his own boss. But in the Ministry he's 'cabined, cribbed, confined'. You know how it is. The person in charge of a Board hardly ever gets a chance to take major decisions independently, and he uses up a lot of energy not on the job itself but on the surrounding routine—agreements, correspondence, phone calls, reports, speeches. By the way, Georgi Nikolayevich, he liked your speech a lot. And I'm with him one hundred per cent." Glebovsky compresses his lips amusedly and bows, hand on heart.

YOU could not help noticing the lively way N. A. Bulganin, in the chair, and N. S. Khrushchov, sitting beside him, reacted to everything taking place in the hall, and the way they conducted the conference. Many of the speakers from the different areas had prepared their speeches in roughly the following way: beginning—report on production successes, figures on plan fulfilment, and facts on positive experience in the use of new techniques; middle—criticism of shortcomings, demands to the Ministries and to *Gosplan;* end—promises by the factory as regards obligations. A fine sort of director, or chief engineer, or shop chief, he would have been if he had failed to report on hard-won achievements or on obligations undertaken! If he had forgotten, better not show his face at the works!

This was well understood by the platform. They listened attentively both to the beginning and end of each speech; but it was the middle that most interested them. And they "nursed" the middle of the speeches, and by their remarks developed the feeling for criticism of shortcomings great and small in our industry.

Oleinikov, a leading smith from the *Uralmash* Works, gave an interesting description from the platform of how advanced technology had been thought out and introduced. During the fifth five-year plan, Oleinikov and his mates had worked out and applied over 100 advanced technological charts, which had subsequently been mastered by 750 smiths. They had succeeded in increasing labour productivity by fifty per cent. The use of special manipu-

* Formerly the central State Planning Organisation.

lators had freed the smiths from the heaviest work and increased their production several times over.

As I have said, Oleinikov described this in an interesting way. He was listened to attentively. Nevertheless, his listing of achievements was too long-drawn-out, and his speech, like those of other speakers, was firmly "attached" to a previously prepared text. Nikita Sergeyevich [Khrushchov] suddenly interrupted him. "You're imitating the other speakers by reading your speech. You speak without your bit of paper. Go on, have a go."

Oleinikov turned to the platform, smiling, and replied: "Nikita Sergeyevich, I was *reading* out the achievements. Now I'm going to *talk* about the shortcomings."

And when he came to the shortcomings Oleinikov's voice rang out impassioned and furious. It emerged that these manipulators had been introduced abroad long before they had been at the *Uralmash* Works, while other native works still hadn't got them. Thirty works had taken blueprints of them from the *Uralmash* Works. What for? The designs had remained designs, mere blueprints. "Why is it", asked Oleinikov, "that the Ministry of Heavy Engineering has not thought of organising production of these highly productive adaptors at one works for all enterprises?"

The Urals smith flung his reproof at the Ministry, and his comrades in Soviet factories and Nikita Sergeyevich smiled delightedly.

"This is a horse of a different colour. You're speaking well, very well."

Nikita Sergeyevich several times interrupted the speech made by Leskov, open-hearth furnace shop chief at the *Zaporozhstal* Works, and always with the same question.

Leskov described what a considerable step forward the use of oxygen had meant at *Zaporozhstal*. Feeding the open-hearth furnaces with oxygen had meant a very considerable increase in the power of the furnaces and a noticeable reduction in smelting time. But the number of furnaces working on oxygen was small, and for some reason the dissemination of this experience was being carried out much too slowly.

"Whose fault is it?" asked Nikita Sergeyevich.

Leskov went on. "Americans who have taken over our methods have more furnaces working than we have." And again the speaker was asked: "Whose fault is it?"

"Oxygen production is developing too slowly", said Leskov. "There aren't enough oxygen stations and they're being built with unwarrantable slowness."

"Whose fault is it?" asked Nikita Sergeyevich again.

You might say that Khrushchov was helping Leskov to move from facts to analysis, and encouraging him not to be afraid to criticise those responsible, even if the criticism had to be directed at the Minister himself.

Leskov then named a Minister—not his own industry's but another's—Raizer, the Minister for the Building of Metallurgical and Chemical Works.

"No one else is to blame?" insisted Nikita Sergeyevich.

At last the *Zaporozhstal* Works engineer named Sheremetyev, Minister for the Ferrous Metallurgy Industry.

"Criticism under pressure", came the ironical comment from the platform. The conference laughed.

That was how our leaders encouraged people to speak out with blunt directness and boldness about all our difficulties and about all those responsible.

The conference speeches were full of facts; these were intended to prove general conclusions which would help in the vital decisions to be taken. In themselves, however, these facts often produced an actual decision on the spot, so that words spoken from the platform at once became deeds.

A. Shmarev, in charge of the *Tatneft* combine, reported on the speed of development in the oil industry in Tataria. There had been a tenfold increase in oil output in the past five-year plan, production costs were half what they had been, and Tatar oil was today the cheapest the country produced. The use of up-to-date Soviet technology had played a decisive role in achieving these results, particularly the method of artificial increase in pressure in oil deposits by special pumping of water.

Nikolai Alexandrovich Bulganin, who had followed Shmarev's report very attentively, objected that they were far behind the USA in oil-boring and that labour organisation was poor.

This observation prompted Shmarev to turn to the negative aspect. He admitted that, alongside the high degree of technological work in oil processing, manual labour still existed in oil-boring—for example in cleaning the wells of paraffin.

The oil-boring brigades spent a third of their time on unproductive work, frequently losing skills and man-power during enforced stoppages more often than not arising from the most paltry causes—equipment, bad roads, lack of electric power. Solving the many problems would make it possible to increase output and further cheapen the price of Tatar oil.

"Precisely which problems?" asked Nikolai Alexandrovich.

"Extending the power basis as required, and making our Ministry finally understand the need to introduce industrial methods of putting up oil derricks."

"Have you brought up these questions here in Moscow?"

"Yes, we have. We've been discussing the question of power with *Gosplan* for the past eight months. As for industrial building of oil derricks, the question's been under discussion in the Ministry for the Oil Industry for a good five years. There's some department chief who for some reason or other doesn't like the method, though he hasn't yet got round to familiarising himself with it."

Shmarev spoke on May 16th.

The very next day, on the 17th, we came across him in one of the halls of the Great Kremlin Palace. Shmarev was a very big man; everything about him was striking, from his great weight (eighteen stone, on his own admission), to the bold lines of his face. He was positively beaming.

"I've got fine news", he boasted. "It was well worth while making a speech. A decision of the Council of Ministers has been signed today. Cuts all our Gordian knots at one stroke."

Presently the conference delegates got back to Tataria. The results of government assistance on the one hand, and the creative initiative of the people on the other, showed themselves in a *Tatneft* promise of a fifty per cent increase in oil output this year. It's worth adding that by and large the Oil Industry Ministry has found ways of increasing oil output by something over two million tons this year.

GLEBOVSKY'S speech at the conference, with other reports, helped to bring out the most important problems, problems going far beyond a single works or even a single Ministry.

N. A. Bulganin had barely called on Glebovsky to speak when that gentle, mild-looking man was transformed; it was as though a tightly coiled steel spring had suddenly been released. And the swiftness of his speech was very like the energy of an uncoiled spring.

Glebovsky dealt with the growth and achievements of the works almost literally in a couple of words. He said he wanted to bring up several questions

of principle which were, in his view, of general importance for heavy industry. He spoke rapidly, emphatically and harshly. He posed the problems very precisely and briefly. He had a great deal to say in the time at his disposal, though the time allotted to him was only a bare quarter of an hour. And he said all he had to say.

" It's not enough to have a decree on the introduction of new techniques ", he said. " Factories must have their interest aroused for economic reasons. Conditions must be created in which it is advantageous for works to introduce new techniques and uneconomic to work with old machinery. Works directors must have the means to encourage people who are introducing new techniques.

" It's about time the rights of directors were considerably extended. At present the Ministry is the director's guardian angel, it protects him, it nurses the poor little mite through the pettiest details and positively leads him by the hand, giving him no opportunity to display any initiative. There's a great mass of controlling organisations with the right to inspect, to make alterations, to impose reprimands and fines. There have already been nine inspections in the first four months of this year. Every commission insists on attention being devoted to it; to avoid unpleasantness, you report to it and produce all sorts of auxiliary material and lose an enormous amount of time.

" This plethora of inspections and reports puts us in the position of the Good Soldier Schweik, whose baggage was stolen just at the moment he was reporting all's well.

" Proposals on the rights of directors must be put forward and introduced without delay. As a director, I should like to receive the right to defend my rights along with my list of duties, or even just to have rights. The Ministry, and many other departments, will then be free from the necessity of petty surveillance, and will be able to devote their attention to more worthwhile matters.

" On one occasion, directors seemed to have got the right to use credits for the introduction of small-scale mechanisation. But the State Bank produced instructions for utilisation of these means of such a kind that it became virtually impossible even to think of action.

" Here are those instructions. Please read them, Nikita Sergeyevich ", said Glebovsky, turning to N. S. Khrushchov.

" You've got everyone curious about your instructions, and now you want me to decipher them ", objected Nikita Sergeyevich. " You'd better read them out to everyone yourself."

So Glebovsky read out extracts from this record-breaking bureaucratic composition, to the accompaniment of laughter and noise in the hall.

" It's essential to give back to the foreman his full rights as chief of his own section of the works ", said Glebovsky, passing on to another important question without waiting for the noise in the hall to die down. " The foreman used to have the right to reprimand or sack a worker for infringement of discipline, and was allowed to establish his own categories.* Today he has lost these rights. It's urgently necessary to make the foreman boss of the ship again."

Having expressed this idea as if hammering a nail into a plank, Glebovsky swept swiftly on, attacking the considerable disorganisation in planning. Neither the Ministries nor *Gosplan* would understand that engineering works could not use all their resources without a two-, three- or four-year plan in advance. At the *Uralmash* Works the production cycle of much of the heavy

* Soviet workers are placed in categories in accordance with their degree of skill and training.

machinery, including the planning, was two to three years. Despite this the works received an annual plan, and that late! *Gosplan* paid no attention to specialisation and co-operation between works. Why were diesel engines manufactured in a whole range of works under four or five Ministries?

Similar practices existed in the production of mining machinery and blast-furnace equipment.

" And why do the big works have to produce such a variety of goods? The variety at *Uralmash* is simply endless; it even includes axes and skimmers. Possibly, from *Gosplan's* point of view, there is a perfectly good reason for a works which produces giants like the walking excavators to have to make skimmers as well. But we've failed to discover any sense in it."

" You ought to mention your own Heavy Engineering Ministry here ", commented Khrushchov. " Axes and skimmers are not *Gosplan's* responsibility, but Kazakov's."

" I'm glad our Minister can hear what you say ", Glebovsky replied, turning to the platform. " There was a time when the war forced every works to make everything for itself—nuts and bolts and elbow joints and all sorts of other small parts. But why should I make elbow joints now? They cost twenty kopecks apiece in a specialised works, but they cost me twenty roubles! The specialised works should supply us with all these small parts.

" I see my time is up. I want to wind up as follows. The framework of present-day planning and departmental organisation is cramping us. In big industrial areas, like the Urals or the Donbas, bodies of some kind should be set up to work out every aspect of the development problems of these important areas, with a view to longest-term plans possible."

Glebovsky said that the *Uralmash* labour force was ready to fulfil the new decisions taken by the Party and the Government, and swiftly left the rostrum. When he was back in his place and already sitting among his Urals colleagues, who were smiling at him, the conference was still applauding, and Bulganin made no move to stop it.

—

" LET'S sit here ", I suggested to Lupandin and Glebovsky.

We went into a small square laid out in front of the cathedral. It was pleasant there; the trees, only recently cloaked in their mantle of soft young green foliage, protected us from the hot sun. It looked as though the unseasonable cold weather, with its unpleasant wind and rain, was really at an end. The stunted lilac might flower now, and the flowers that had seemed frozen in doubts about this strange spring might begin to bloom.

We sat down on a bench in silence.

I interrupted the silence with a question. Many of the conference speakers had sharply criticised, you might almost say attacked, the Ministries and *Gosplan*, accusing their staffs of bureaucratism. But it was the Ministries' job to help production, to lighten and improve production work. How was it that the opposite so often happened, that they interfered and put obstacles in the way? What was the matter?

" It's a long time since we were called together ", said Glebovsky meditatively. " A lot of things had accumulated and matured, there were a lot of sore subjects. That explains the fierce criticism. Of course nobody denies the importance of the Ministries; it would be impossible to guide industry without them. But on this occasion we more or less took all the great good they do for granted, and talked mostly about their slip-ups. That's what created the impression you've got."

" Don't you go excusing yourself, Georgi Nikolayevich. And don't abandon your position ", said Lupandin, shaking his head.

Glebovsky began to laugh.

"I'm not softening up or giving in. You didn't get my meaning."

"When I came to work as a young man", Lupandin went on forcibly, "I was shown machine-tool DIP-200, and I was told that DIP meant 'reach and overtake', in factory parlance. That same machine-tool is still to be found in many workshops today. Are we still overtaking with that out-of-date tool? I'll never forget how Minister Kostousov raged and stormed about the shortcomings in *Gosplan's* work. Remember?"

"Yes, it was a fighting speech", Glebovsky smiled.

"It seems to have been too much even for him. *Gosplan* took up a wrong attitude, and it led to serious defects in the machine-tool industry. As I recall, Kostousov said the number of designers and technologists must be increased two and a half times to create a powerful machine-tool industry. I'm a bench worker, and I understand what the development of a highly qualified designer means. Why don't they understand it in *Gosplan*? 'The tasks are growing, but financing is standing still. Standard plans for staffing and wages are like dead weights.' Isn't that what the Minister said? How does it happen? Who invented norms that mean a milling-machine operator with given qualifications gets half as much if he works in Kharkov as he would if he worked in Barnaul or Minsk? Do a man's qualifications alter because he catches a train from one town to another? Of course not. No wonder Nikita Sergeyevich kept asking: 'Whose fault is it? Whose fault?'"

Glebovsky listened to Lupandin very attentively, nodding his head in agreement. I had noticed he was a good listener; it showed what attention he paid to people.

"Nikita Sergeyevich gave a striking example with the two stonemasons," I remembered. "They had similar qualifications, and they were working on opposite sides of the same street on two big buildings. One of them got more than the other. Try explaining to them that the difference was that one was working for the Moscow City Soviet and the other in the Iron and Steel Ministry!"

"I can give you an equally striking example from my own works", said Glebovsky scathingly. "Take the long-service bonus, and prizes, for example. There's a pretty kettle of fish for you. Just imagine: the footplate teams bringing the wagons into the steel-smelting shops get bonuses. If they take the same wagons into other shops, they don't get a thing. Why? Because different Ministries have different rulings. Crazy, isn't it? I think so too. But we haven't managed to get rid of this craziness yet. That's one reason for the fierce attacks on *Gosplan*. And on the Finance Ministry, which, I may say in passing, has acquired a whole lot of functions in the past few years not really within its competence. Do you know this, for example? We equip a brickworks for our own building requirements; and not far off another Ministry builds another identical works. What on earth do we need two for, when one, a bit larger, would be much better? Last year *Gosplan* allocated us the task of preparing foundry cast iron for our neighbours, the *Uralelektroapparat* [Urals Electrical Equipment Works]. But we hadn't enough for our own requirements. 'Never mind', replied *Gosplan*. 'We'll give you instructions!' And so they did: get your own foundry cast iron from Voroshilovgrad! And so we're turned into commercial travellers. I suppose you think this is all completely barmy, eh?" Glebovsky asked me.

"I had a fair taste myself when I was a business executive", I replied equably, although the facts he quoted made me see red.

"It's not a matter of technique. There's nothing we can't do with that. We're fairly bursting with it. You've only got to talk to Pavlov, our chief designer", said Glebovsky.

" What do you think are the main difficulties?"

" We've accumulated a mass of knowledge. There's nothing we can't do. Just look at the extraordinary machines we make ", Glebovsky mused aloud. " But bad planning ties us down hand and foot. So do out-of-date principles of organisation and administrative methods. Bulganin hit the nail on the head, you know, when he said it was easier to invent, design and assemble the most wonderful object than it is to put it into production."

" That's something all of you, yes, all—leading industrial personalities, ministers, directors, engineers, workers, and you writers too—should pay attention to. Yes, writers ", repeated Georgi Nikolayevich, responding to my smile. " It would be well worth the while of those authors who write about the working class to emphasise in their novels, stories and sketches that an increasingly important part is going to be played by well-thought-out, sensible, flexible administration."

Glebovsky confirmed what I had recently been pondering on. The rapid development of socialist economy, the swift and untrammelled increase in all branches of our economy, all require particular attention to forms of organisation and of administration. These forms must be continually improved and must not get out of step with the interests and requirements of development, however rapid. What was progressive ten, five or three years ago, today acts as a brake. A great deal in the system of planning, in administration techniques, in methods of production organisation, in wage-scales and financing, is recognisably a hangover from the war time and immediate post-war years, although industry has long since exceeded all pre-war and post-war levels.

" The costs and mistakes of growth ", said Glebovsky. " Production and techniques often grow more rapidly than people do. Those people make mistakes. The mistakes frighten the chiefs in the Central Boards and Ministries, and then you get excessive caution, unnecessary guardianship, interference at every step. The people's pennies must be taken care of; so must coal, metals, power. That is indisputable and right. But faults emerge as a result of such caution: excessive checking and pressure, inspection for inspection's sake, and accounting for accounting's sake. As a result, a works no longer has the right to lift a finger on its own initiative, and can't carry out even an insignificant experimental job. Remember Kovalyov, the chief designer of the Leningrad Stalin Works, saying ' We're assembling turbines without a trial turbine.' How can you work like that, straight from blue-print to production? How many beginnings come to nothing? It takes two or three years to sort it all out, and in that length of time the youngest idea has gone grey. I expect you know the anecdote about the invisible adviser, so dear to our business managers."

" Never heard it," I replied.

" Well, the ' invisible adviser ' is a certain part of a boss's anatomy. If anything at all risky has to be done, he asks his adviser whether it would be willing to part company with its armchair."

Lupandin laughed and promised to use the saying on one of his chiefs who would be the better for hearing it.

" It's not a particularly witty saying," Glebovsky went on, " but it has a basis in fact. The system of over-detailed petty control from all sides has evolved into a system of insurance against any sort of unpleasantness. Ask any works director, and he'll tell you how much time, energy and nervous strain he has to spend on envisaging all the possible unpleasantnesses that might occur. People lose the ability to take risks or incur the possibility of risks, and they choose the safest and best-trodden path. This is nothing but complacency or what-do-I-care, isn't it? Why do we produce great machines which are uneconomic in their use of metals? Why do we permit ourselves to supply industry with

out-of-date designs? Because it's easier, safer, surer. A new piece of machinery might not work out, and then you'd spend a year excusing yourself and writing explanations. And even then you might not succeed in excusing yourself."

"Enough conflicts there for a writer, eh? Or shall I produce a few more?" Glebovsky asked me, after a short silence. He exchanged glances with Lupandin and they both smiled restrainedly, evidently not wishing to hurt me.

"Dish some more out, go on. The conflicts'll come in useful", I laughed.

"Well, then, don't forget that directors and milling-machine operators have personal lives as well; wives and children. They're quite right to tell you writers off for underestimating personal life. You keep asking us about production. Mind you don't crush us dead under your metals."

"And I just wanted to say a word. May I?" Glebovsky asked Lupandin. "Risk is a noble cause, the saying goes. Apply it to some of our production chiefs and it sounds ironic. A few days ago our deputy chief engineer proposed centralisation of a particular type of production, at a Ministry conference. One way and another, you can't escape it. And if no Ministry will undertake it let's do it ourselves. Show some consciousness, as they say. So the chief of one of the Central Boards was sitting next to me, and he said: "This idiot seems to think we're living under communism; fancy undertaking such a burden voluntarily!"

"Ah, a conscious comrade!" Lupandin nodded. "Yes. Extremely conscious. Mind you, there's another side to the medal. I wanted to emphasise that we production chiefs are not exactly crammed with well-thought-out, thorough decisions by the planning organisations. And we often meet with casual decisions, lacking in value, divorced from the real life of production. A factory decides, for example, to introduce some sensible adaptation; but there are none ready-made—no one manufactures them. We make the product ourselves, with considerable difficulty. And what happens then? When they get to hear of it, we have to start producing it for others! What on earth for? It's not our line of work. I could quote a lot of similar examples." Glebovsky shrugged his shoulders. "It works out that you have to be wary about 'carelessly' introducing new technology. Otherwise, before you know where you are, the full weight of it will fall on your shoulders."

"There's a director's life for you!" exclaimed Lupandin in some astonishment. "How right I am to stick to my bench and refuse promotion. But Georgi Nikolayevich Glebovsky has no intention of giving up a director's worries. It's interesting, isn't it?"

"Yes", replied Glebovsky seriously. "And it looks like getting more interesting than ever now. Release our initiative, and we'll be quite capable of full responsibility. The scale of industry will be doubled in a few years. Is every blessed little thing going to go on being planned at the centre?"

Yes, it is quite clear that many important problems are bound to be solved in the immediate future. Tomorrow Glebovsky himself will be working in a commission rapidly drafting rules for directors' rights. Who better? A government decision has already been taken on the sub-dividing of *Gosplan* into a long-term perspective planning commission and a current plans commission. A work and wages committee under the chairmanship of L. M. Kaganovich has been set up. There is a decision on the creation of a State committee for introducing advanced science and new techniques into production. A new stage in our Soviet industry is coming. It would be difficult to overestimate the importance of what has happened.

TWENTY years have passed since leading industrial workers, the production vanguard, met in the Kremlin at the First All-Union Stakhanovite Conference

—twenty years which are history. What pages have been written by the working class: the third five-year plan, the patriotic war and the victory over fascism, post-war reconstruction, and the post-war five-year plans.

If you read the documents of the earlier conference and the present one carefully, you can understand what has happened to the working class of the country. Then it was in its youth; today it has achieved maturity, the powerful and wise maturity of a class steeled in the experiences of a fearful war and of continual labour victories.

It is worth while to tot up the daily output of all pits and mines and factories in tons of steel and iron, coal and oil, the number of cars and locomotives, excavators and rolling-mills. Take May 16, 1955, the day the All-Union industrial conference opened, and another date, November 14, 1935, when the first conference opened in the Kremlin under Sergei Ordzhonikidze. Take the figures, add them up and compare. How the ability of the working class has grown, how its labour productivity has increased! Such figures tell you a lot about the life-story of a class. Or you might simply list all the factories built during the first, second and third five-year plans, restored after the war, and built in the fourth and fifth plans. Even a simple list like that tells you a lot about the life-story of the working class.

At the time of the first conference in 1935, a young man called Nikolai Lupandin, son of a plasterer at the Kharkov Tractor Works, entered the shop for the first time. He was set to work at a lathe. After his shift was over, he deliberately refrained from going to the showers or even washing his hands. Let everyone see a worker coming down the street from the factory. Some three years later he was recognised in the street for other reasons. He was already a skilled craftsman in milling metals, and had proposed technical improvements: he had begun making mills from jettisoned equipment, the first rationalisation proposal to raise labour productivity.

How many of them came later on!

Improvement after improvement, innovation after innovation, dozens of inventive proposals. They stood like landmarks in Lupandin's life, marking its progress as did his participation in historic events: the war, evacuation from Kharkov to Stalingrad, tank production at the Stalingrad Tractor Works, evacuation of the latter to the Urals, work at the Chelyabinsk Tractor Works; tanks for the front, and then, after victory, tractor production for agriculture and a joyous return to Kharkov in 1948.

And today Lupandin is a milling-machine operator with high labour productivity, a teacher and guide for young people, many of whom work according to his methods. On May 17 in the Kremlin he had every right to say: "Technology is considered among us to be a dogma; I have refuted this."

And what was engineer Georgi Nikolayevich Glebovsky doing at the time of the 1935 conference?

Son of a chemical worker at the Petersburg Gunpowder Works, he had a difficult childhood. His father died when the boy was in his eighth year. He has every right to say: "Soviet power and the Soviet state brought me up"—a children's home, a secondary school, the Urals Metallurgical Institute. When he graduated from the institute in 1934 he began work at the *Uralmash* Works as assistant foreman.

At the time of that first conference, Glebovsky was working as shop technologist. During the five-year plans and the war he went through the hard grind of an engineer's training, and he mounted the Kremlin rostrum as director of a leading works, one of the biggest in the country.

Translated by Eleanor Fox.
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PAVLOVIAN MEDICINE

B. H. Kirman

IT has long been the hallmark of a good physician that he treats his patient as an individual, as a personality, as a living whole. It was Pavlov, however, who for the first time convincingly demonstrated the physiological basis of this integral understanding of the person in health and disease. In particular it was he who gave the death-blow to the dualism which had previously dominated medical thought in regard to body and mind, physical and mental, organic and functional, structural and psychological.

Pavlov and his fellow workers have been able to apply to human medicine the lessons which they derived from careful study of the behaviour of thousands of experimental animals, studies based predominantly on observation of the salivary reflex in dogs but extending to the function of the entire body and including comparative examination of many species of animals. They convincingly demonstrated that in man all bodily functions are continuously under intimate control by the cerebral cortex, and that this relationship has a two-way character. Diseased states of the brain are reflected in disturbance of function of the entire body, while localised disease of any organ affects the state of the brain. Hence the surgeon who reprimands his students for referring to "an appendix" in a hospital bed, and for ignorance of the patient's name, has the support not only of his accumulated clinical wisdom but also of physiological theory and practice.

The original observations of Pavlov on the nervous control of the blood circulation and other internal functions have been greatly amplified by his pupil Bykov and by the "third generation" of Pavlovians (Popovsky, 1953). They were able to show that the prevailing notion of a somewhat rigid division of the work of the nervous system, with all the lower functions controlled by the vegetative or autonomic part of this system, was incorrect. On the contrary, they showed that in health it is possible to condition an individual to the most varied stimuli at will, including words, and that these stimuli will then themselves alter the internal functions.

An experiment of this type carried out in Bykov's laboratory demanded the patient co-operation of a number of students, who sat with one hand surrounded by a coil through which could be passed hot or ice-cold water. The volume of the limb was registered at the same time so that alterations in the calibre of the blood vessels could be recorded. The temperature of the water served as the unconditioned stimulus to which there was an automatic response. This was linked with another stimulus, for example a light. After many such combinations the exhibition of the light was sufficient alone to produce an alteration in the size of the blood vessels in the limb.

It was thus shown that in health the cerebral cortex brings about delicate adaptations between the external and the internal environment of the body. In disease the picture altered. In cerebral, spinal and peripheral disease the close adaptation which had previously existed was lost. The blood circulation in an affected limb remained permanently impaired after cerebral hæmorrhage, in syringomyelia and in disease of the blood vessels of the limb. The arm or leg in such cases was permanently blue and cold. Conditioning experiments in such cases were usually without success. In some instances, however, it was

found that success could be obtained and that the circulation in the limb would change with external stimuli operating through the brain.

The importance of the functional state of the cerebral cortex for the preservation of normal health in the different bodily organs was early recognised by Pavlov. A study of digestion which occupied his attention in the early stage of his career, and earned him a Nobel prize in 1904, provided ample confirmation of this fact. He devised a new technique, which now bears his name, for the artificial formation of a separate gastric pouch by means of which the activity and functional state of the main stomach could be studied without being disturbed (Pavlov, 1952). By this means he was able to demonstrate the quantitative and qualitative response of the stomach to meat, bread and milk. Pavlov also showed that it was relatively easy to form conditioned reflexes which resulted in a flow of gastric juice, just like those which produce salivation. Thus, the sight of meat was sufficient to produce a flow of peptic juice. Much subsequent work has shown that, in addition to the glands of the gastric mucosa, the blood supply and muscle of the gastric wall are also under intimate cortical control. The importance of these considerations for the treatment and prevention of peptic ulcer is obvious. This lesion can no longer be considered as a local disease, but can be looked upon as evidence of a more widespread disorder of function, in effect as a neurosis. This type of approach differs from the " psycho-somatic " school of medicine in that it offers a material and physiological explanation for the phenomena in the gut, while the current versions of " psycho-somatic " teaching usually put forward a psycho-analytical explanation involving the assumption of an " unconscious wish " for illness.

It was found possible to produce experimental neuroses in animals by a whole variety of methods.* These neuroses showed themselves in two ways : either a disturbance of the general behaviour and adaptive capacity of the animal or the development of local abnormalities in the organs, skin, gut, circulation, etc. Most often these two types of neurosis were combined. Neuroses could be produced by excessively powerful stimuli, the Leningrad flood which overran the laboratory, or by very loud noises. They could also be produced by other combinations of unfavourable circumstances. For example, a difficult task was sometimes sufficient to cause the appearance of signs of neurosis. This is illustrated by the classic Pavlovian work in which a dog was shown sometimes a circle and sometimes an ellipse. One stimulus was reinforced by feeding, the other not. Accordingly the one acquired excitary power, the other inhibitory. All went well as long as the two objects were readily distinguishable. When, however, the difference in shape was very slight, i.e. when the ellipse was nearly round, then the animal became neurotic. Symptoms of neurosis could be produced also by fatigue and by too rapid switching from one established set of conditioned stimuli to new patterns of stimulation, to be used as conditioned signals, i.e. attempts at rapid changing of stereotypes. A gastric neurosis was one form which neurotic symptoms might take, and the relevance of all these groups of unfavourable conditions for the prophylaxis of peptic ulcer will be obvious. The long distance lorry driver, as an example of ulcer-prone groups, is exposed in the course of his occupation to just such stimuli. He daily experiences the excessive stimuli, very loud noises, excessively prolonged stress, and he may also have to contend with tasks of discrimination which are very difficult, e.g. in adverse lighting conditions.

Pavlov's findings with dogs showed that, like humans, some individuals are

* See *Experimental Breakdown in the Higher Nervous Activity of the Dog in Natural Conditions, in SOVIET MEDICAL BULLETIN,* Vol. I, No. 3 (September 1954). SCR, 1/6, post free 1/9.

much more prone to nervous breakdowns than others.* Sufficiently adverse circumstances would, none the less, cause even the dog with the most stable temperament to break down. On the basis of the Pavlovian findings it is to be expected that improvement in the working conditions of lorry drivers, elimination of noise and glare, reduction of working hours, adequate rest periods and similar measures would lead to a reduction in the incidence of peptic ulcer. Similar considerations apply to a wide range of somatic and mental illness.

Another wide field of application of Pavlovian principles has been set out in relation to established illness by Pavel Beilin (1954) in his *Story About One Big Family,* which is an account of the adoption of Pavlovian methods in the Makarov District Hospital. This particularly concerns the general attitude to the patient. Pavlov and his colleagues noted that resistance to unfavourable conditions is lowered by somatic illness, and that animals which are generally ill are more liable to disturbances of cortical function. The staff at the Makarov hospital took this as a basis for an alteration in the working methods of the hospital. The steps which they took were simple, elementary and obvious, but ones which are too often neglected in dealing with sick people. They were at great pains to reduce unnecessary and excessive stimulation of their patients. They eliminated all possible sources of noise in the hospital. Applying Pavlov's views on the value of sleep in therapy and its relation to protective inhibition, they jealously guarded the sleep of those in their care, refraining from disturbing them and not allowing others to do so. No doubt those who have themselves been hospital patients will think of other ways in which these principles could be applied in practice.

Similar considerations apply to the handling of other groups of patients. Just as an illness renders a person more liable to suffer from the ill effects of unfavourable combinations of stimuli, i.e. excessively strong, unduly prolonged or presenting undue difficulties in differentiation, so too childbirth, unless carefully managed, may have a similar effect. Hence the number of cases of mental disturbance associated with pregnancy and delivery. The Pavlovian school have sought, by careful preparation and management of pregnancy and delivery, to eliminate any such ill effect. They claim to have been so successful in this that they have also removed much of the pain and fear associated with childbirth, rendering anæsthetics unnecessary in a high proportion of cases. (Tetrov-Masalakov and Zachepitsky, 1953.)

Two of the causes of pain during childbirth which were considered amenable to prevention by Pavlovian methods were exaggeration of pain as it were by repute, and also by virtue of the exaggerated effect of unpleasant stimuli which goes with hitherto unknown experiences. Pavlov considered that words operated in a similar manner to other conditioned signals, terming them the second signalling system of reality. By means of words it is possible to link the experience of childbirth with pain. This is commonly done ; the woman expecting her first baby is often persuaded that the experience will be much more painful than need be the case. The very fact, however, of persuasion that delivery will be painful does have the same effect as actual painful stimuli, producing every sign of distress, acting in fact as a conditioned signal.

Another fact which Pavlov noted is that in unusual circumstances the response to a noxious stimulus may be greater. We have all noticed that if we are in a strange place, in a state of expectancy, we jump at some slight noise to which ordinarily we would not react at all. Many women embark upon

* See *The Theory of Types of Higher Nervous Activity,* in *SOVIET PSYCHOLOGY BULLETIN,* Vol. II, No. 1 (February 1955) ; *Higher Nervous Activity and the Problem of Perception,* ibid. Vol. II, No. 3 (August 1955) ; *Problems of Soviet Surgery,* in *SOVIET MEDICAL BULLETIN,* Vol. II, No. 2 (June 1955) ; each 1/6, post free 1/9.

childbirth with little or no notion of what is to happen, either ignorant of the anatomy and physiology of delivery or possessed of a few incorrect ideas. Soviet obstetricians dealt with these two aspects of the problem among others. They set out to counter the propaganda to the effect that childbirth is inevitably very painful. At the same time they carried out mass educational work among pregnant women to prepare them for delivery. For this purpose many simple brochures, pictures, diagrams, films and other material were made available, lectures were given and the mothers-to-be were made acquainted in every possible way with the simple facts of the natural processes of pregnancy and delivery. At the same time false notions and superstitions were rigorously combated.

The same principles have been applied to other patients, in particular to children. The stimuli which distress a child on entering hospital or the operating theatre are not so much actual painful stimuli as the whole impact of the strange environment, the unfamiliar sights, sounds and smells. Attempts are now made to render Soviet children's wards as homely as possible. The children are encouraged to take their own favourite toys with them. Where possible they may be taken into the operating theatre on a day prior to the operation and the first visit treated as something in the nature of a game, so that they will be familiar with the surroundings and not unduly frightened on the day of the actual operation.

Among the more specific applications of Pavlovian work to medicine may be mentioned its use in psychiatry. Its relevance to mental disease is obvious and this is a field which particularly interested Pavlov himself, especially in his later years, during which he spent much time observing mentally ill patients (Pavlov, 1941). He came to the conclusion that the abnormal phenomena observed in mental illness were of the same nature as those observed in dogs and other animals when the function of the cerebral cortex is disturbed. This was particularly found to be true of the neuroses and of such psychoses as schizophrenia, in which the disorder is functional in nature and in which there is no gross disturbance in the structure of the brain.*

Pavlov and his colleagues found that many factors were able to produce an artificial neurosis in dogs and that it was possible to treat such conditions. M. K. Petrova was a pioneer in this field and conducted a number of successful experiments in 1927 (Ivanov-Smolensky, 1954). Two types of change in the activity of the nervous system of dogs subjected to severe stress were liable to occur. In the first stage, which Pavlov called the " paradoxical ", the animal reacted excessively to slight stimuli and vice versa. We can see a parallel between this and the bomb-shocked patient who reacts violently to the slightest sound.

The second phase of abnormality is more familiar to us in patients with serious forms of mental illness, but is also encountered in the neuroses. This is the " ultra-paradoxical state ". In this condition the patient or experimental animal will react in the opposite way to the normal in response to a conditioned, or even an unconditioned, stimulus. Thus he will refuse food, the sight of which may make him vomit and he may think that it is poisoned. Even the most powerful reflexes may be reversed in this way, so that such a patient if not treated might die of starvation or might seek to destroy himself by other means. In such a state groups of conditioned reflexes determining social behaviour may be temporarily suspended and reversed so that a normally discreet and reserved person will expose his sexual organs in the presence of many people or will astonish his friends by a torrent of lurid language.

In dealing with artificial mental disturbances, Pavlov's colleagues found that

* See *The Treatment of Neurotics by Pavlovian Methods,* in *SOVIET MEDICAL BULLETIN,* Vol. I, No 1 (March 1954). (O.P., available for reference.)

minor forms of neurosis could usually be very readily treated by a modification of the conditions which had produced them. It is obvious that this has very wide applications in the field of mental health, particularly in industry. A task which was too difficult for the animal, e.g. the distinction between a circle and a near-circular ellipse, was liable to cause a neurosis. The same task which caused a breakdown could, however, be successfully solved without difficulty if the number of intermediate steps leading up to the very difficult task was increased. In animals which had developed neurosis as a result of fatigue, it was often sufficient merely to allow them a period of rest, without experiments, for full recovery of normal function to take place.

Another method of causing neurosis was by rapid changing of the stereotypy in experimental animals. By the term "stereotypy" Pavlov implied those combinations of conditioned responses which constitute the established habits of the animal. A sudden change in the significance of stimuli was sufficient to upset the whole delicate adjustment of the animal. This happened when stimuli which had been inhibitory were now reinforced and vice versa. It was found, however, that animals could be accustomed to the new conditions if they were allowed to "learn" them in easy stages. The significance of this work is of obvious importance both in mental health and in education.*

A method of treatment which has long had a place in the treatment of mental illness by both orthodox and unorthodox practitioners is the use of hypnosis and suggestion. Until the time of Pavlov no physiological explanation of these methods was available and they were often looked upon as a form of charlatanry. Pavlov showed (Platonov, 1951) that hypnosis is merely one form of the generalisation of internal inhibition which can regularly be produced in animals by the use of a monotonous repeated stimulus without reinforcement and without distracting stimuli which act as disinhibitors. It is closely allied both to normal sleep and to the form of protective inhibition which is seen in catatonia. In hypnotic suggestion there is an island of activity in the cortex against the background of general inhibition. This island of excitation assumes a dominant role which it would not have in a normal waking state, when the stimuli which constitute the suggestion would be subject to the critical analysis of the entire cortex. In such a state, however, they can be uncritically accepted and acted upon. Such islands of abnormally isolated activity are also encountered in dream states and fixed delusional states, where they may also dominate the whole activity of the individual. Rozhov (1954) gives an outline of the role of hypnosis and suggestion in medicine. It should be emphasised that for Pavlovian teaching there is no basic difference between the suggested *idea* in word form and other forms of stimuli which give an impression contrary to reality. Thus, a patient who has been conditioned to the passage of cold water through a coil round the arm may react with a constriction of the vessels in that arm if he is told that the cold water has been turned on, even if warm water is used. A person conditioned to an injection of adrenalin may experience all the effects of adrenalin if given distilled water, and may *think* that he has had adrenalin.

Sleep has long been known to be of fundamental importance in mental health. Pavlov's researches, however, for the first time provided a rationale for the use of sleep therapy. Soviet authorities (Kerbikov, 1954) stress the difference between *sleep* therapy and continuous narcosis, which had a vogue in this country and which aimed at a much deeper state of unconsciousness than is present in natural sleep. The latter method had the disadvantage of much

* See *Some Results of Electrophysiological Investigations of Conditioned Reflex Links*, in *SOVIET MEDICAL BULLETIN*, Vol. I, No. 2 (June 1954). 1/6, post free 1/9.

greater danger, greater demands on the nursing staff, greater risk of pneumonia, and the possibility of serious confusional states amounting sometimes to a major psychosis.

As mentioned, Pavlov looked upon natural sleep as a form of protective inhibition (Pavlov, 1927). He did not consider that there was any particular sleep centre in the brain, but looked upon sleep as a function of the entire cortex. Fatigue normally results in sleep, being aided in this by the same factors as operate in hypnosis, monotonous stimuli and absence of reinforcement or distracting stimuli to act as disinhibitors. Particular stimuli can acquire an active inhibitory role. This applies to all the little habitual procedures which precede going to bed, undressing, putting on of night clothes and the like, which become in themselves potent soporific agents. It was found in the course of treatment by prolonged sleep that stimuli which had acquired this effect could be used instead of drugs, i.e. an injection of isotonic saline acquired the effect of sodium amytal.

Sleep therapy has had a very wide application in Soviet medicine. There is a tendency at the present time to point out that it is not a panacea and that it is possible to have too much even of a good thing. Its uses have been summarised by Strelchuk (1953). It is still most valuable in psychiatry, though it has many applications in somatic medicine. A recent volume on sleep assembled by Bogorad (1954) shows the wide scope of the problem in both medicine and physiology. The first section on sleep in experimental animals includes a chapter on apes. Krasnogorsky contributes a chapter on the physiological mechanisms of sleep in infants, while Mayorov discusses the phases of sleep. Popov writes on dreams, while Bykov and Slonim contribute a chapter on the physiological basis of "time" in human and animal organisms. The largest section is devoted to therapeutic sleep. Gilyarovsky writes on electric sleep, while the diseases considered for this mode of therapy include schizophrenia, the neuroses, tuberculosis, drug addiction, organic lesions of the brain, concussion, surgical cases after operation and a wide range of visceral lesions.*

The later work of the Pavlovian school has emphasised that, while the importance of neural control and disorder is self-evident in psychiatry, there is no bodily function which is not directly governed by higher nervous activity and which is not subject to conditioning. Even functions which seem profound, vegetable and inaccessible to psychological influences are in fact also governed this way. The importance of higher nervous activity in skin disorders has long been recognised, partly because the skin is a visible organ, it can be seen to blush and blanch under the impact of verbal stimuli. Petrova in her initial work on experimental neuroses noted that skin lesions were often associated with these, disappearing as the neurosis improved.

Less obvious is the relationship between conditioning and such matters as the acquisition of immunity to infectious diseases or the development of neoplasms. Yet both of these processes can be shown to be influenced by conditioned reflexes. Dolin and Krylov have shown the effect of conditioning on immunity (1952). They demonstrated that the reticulo-endothelial system, like other organs, is under nervous control, and is sensitive to the highest activities of the brain. Their work is a natural sequel to that of Speransky on infection, allergy and immunity. They found that a conditioned stimulus (placing a rabbit in a box in which it customarily received a dose of vaccine) was sufficient to produce a rise in agglutination titre although uncombined with

* See *Problems of Soviet Surgery*, in *SOVIET MEDICAL BULLETIN*, Vol. II, No. 2 (June 1955). *Experience of the Use of Prolonged Interrupted Sleep in the Treatment of Neurological Ailments*, ibid. Vol. II, No. 3 (September 1955). Each 1/6, post free 1/9.

the unconditioned stimulus (Gaertner vaccine). They produced similar results with Flexner dysentery vaccine.

These few examples may serve to show the fundamental importance of Pavlovian technique and theory for physiology and psychology in health and disease. Perhaps one of the most important aspects of this approach is the unifying effect which it has on the work of the physiologist and the psychologist. In dealing with applied human psychology the latter is continually concerned with problems of consciousness, normal and disturbed. Much of Pavlov's work may be described as the physiology of consciousness. Outstanding in this connection is Pavlov's concept of speech as a second system of physiological stimuli signalling external and internal reality. Speech thus provides an additional notation, usually of a kinæsthetic and auditory type, supplemented by vision in literate peoples. (In exceptional circumstances this extends to the tactile analyser in the blind and deaf-blind.) This system of verbal notation provides a means of reference and of more precise analysis of present experience in the light of accumulated past experience of external and internal conditions in the lifetime of the individual. In addition this notation, being semi-standardised, has the advantage of being transmissible from one individual to another and from one generation to another, and, in the case of written speech, being recordable.

Pavlov regarded the development of this second signalling system as marking the essential difference between humans and other animals.

The Pavlovian concept of speech as the basis of the higher, and peculiarly human, levels of consciousness is in accord with the view of language as " the living reality of thought ".

Krasnogorsky (1952) was the pioneer in the application of conditioning methods to man, and carried out classic work on the development of speech in infancy.* He showed that words related by meaning were potent as secondary and tertiary stimuli.

Hypnotic suggestion provides an example of disharmony between the first and second signalling systems. In this condition words may dominate cerebral activity to such an extent that they no longer serve as signals of external reality but serve rather to conceal that reality. This is also true in many psychotic states. Norbutovich (1952) has shown that such a state of faulty balance between the two signalling systems exists when hallucinations are present.

We are still far from that state which Pavlov envisaged when he spoke of the possibility of unity of the subjective and the objective, but it will be seen that Pavlovian technique now permits of an objective study of subjective phenomena, of human consciousness and of human intellect. This development will make possible more effective treatment and prevention both in psychiatry and in somatic disease.

(*See References, p. 38*)

* See *The Physiological Development of Speech in Children,* in *SOVIET PSYCHOLOGY BULLETIN,* Vol. II, No. 2 (April 1955). 1/6, post free 1/9.

A S J Moscow Letter

KIEV'S TRANSFORMATION

Ralph Parker

THE gleam of gold flashing from the central cupola of Sancta Sophia suggested that we should find Kiev in festive guise. Gold had been the dominant tone in the undulating landscape of the Poltava steppes we had driven through for most of the 300 miles between Kharkov and the Ukrainian capital. Combine harvesters, resembling great Spanish galleons as they rode the slopes, were still gathering in a harvest that promised to be well above the average, but much of the golden grain lay heaped on the highway itself; the tarmac makes an excellent drying-floor and at this time of the year the earth roads are firm enough to take the traffic, though there were places where we found ourselves driving literally through the harvest.

There were more private motorists than ever on the main roads this summer. A petrol-pump operator at a filling station near the Bielgorod war memorial told us he had almost twice as much work with privately owned *Pobedas* and *Moskviches* as last summer. And long-distance coach travel with stops at new roadside hotels is now well established. Newcomers on the Moscow-Simferopol highway this year are huge aluminium-cased refrigerator vans bringing fish from Kerch.

To compensate for an absence of landmarks that would dismay the motorist accustomed to the densely populated countries of western Europe, one has the unusual experience of motoring across pages of literature—or, to those of us who have vivid memories of the last war, from point to point in military chronicles. Among the large hand-painted boards (Russia has as yet no large printed posters) beside the road, exhorting the traveller to volunteer for work on virgin soil, to plant maize (a huge corn-cob on which every grain wears a pig's snout, for behind the present campaign for maize-growing is the need for more feeding stuffs for animal husbandry), to study latest techniques, and to eat more vitamins, one sees others to remind one that at Shchekino the Chekhov family house is now a museum, that one is nearing Yasnaya Poliana, that five miles of rough track off the main road near Mtsensk leads to Turgeniev's home. Outside Kharkov one catches a glimpse of the old monastery that Makarenko's boys and girls rebuilt on their road to life; and soon one is nearing Gogol's country: Poltava, Mirgorod . . .

The opportunity of making a literary pilgrimage is one of the attractions of long-distance motoring, and this summer there were motorists' encampments near many of the "house museums" along the road to the sea, places where in the evenings, before the travellers turned in by letting down the backs of the front seats and drawing blinds over the car windows, one could be sure of hearing many a tale of adventures on the road. A great road-building programme is being carried out and each year private motorists penetrate more deeply into trans-Caucasia, into Lithuania, the Carpathians, and eastward along the new Moscow-Peking highway. And while the men talk motoring shop—rather technical this, for every driver has to pass a difficult examination in mechanics—the women talk literature. One of the results of the great trouble Soviet schools have taken during the past twenty years to instil into

youth a feeling for the Russian classics is the creation of a commonly shared appreciation of landscape. There is food for thought in the idea that Russians have been taught to see the beauties of the countryside far more by their writers than by their painters; the best paintings of Russian nature are not on canvas but in print.

When I last visited Kiev it was a shabby, badly knocked about city disconcertingly dominated by what remained of its nineteenth-century buildings. To the traveller who expects to find in Kiev many memorials of its medieval glory the city is likely to prove a disappointment. Even the eleventh-century Sancta Sophia is, in its present form, essentially a baroque structure; and this was equally true of the Church of the Dormition in the Crypt Monastery (*Pecherskaya Lavra*), which was almost entirely destroyed by the Germans during the second world war. Old Kiev, that is to say pre-war Kiev, was a Ukrainian baroque city to which Rastrelli of St. Petersburg contributed two buildings in a less provincial baroque style—rococo indeed. (The Church of Saint Andrew is erroneously described by G. H. Hamilton in *The Art and Architecture of Russia* [Pelican History of Art] as having been destroyed.)

Now nothing looks shabbier than run-down rococo, and in 1947 the Ukrainian authorities were much too deeply involved in providing shelter for homeless villagers and repairing damaged homes in the capital to pay much attention to eighteenth-century public buildings. Moreover, there was the problem of the Kreshchatik.

The Kreshchatik is Kiev's forum. The level bottom of a steep-sided valley close to the Dnieper, it has been the gathering-place of the *Kievliani* since the dawn of Slav history, and its slopes have supported sanctuaries, shrines heathen and Christian, temples, theatres and markets, which have given the place a special significance to all Ukrainians. During the second world war the Kreshchatik was totally destroyed, and though, perhaps, the buildings whose wreckage blocked the road for half a mile had no very great artistic value, their loss was painfully felt by a people of resurgent national pride.

A few days after the Red Army liberated Kiev, N. S. Khrushchov and a group of officers made their way with difficulty through the debris of smashed masonry to survey the damage. Orders were given that German prisoners of war should clear the road and strips each side of it to a depth of about a furlong. Then, after the war, the *Kievliani* set about rebuilding their Kreshchatik. There was a note of challenge in the way they laid an eighty-foot-wide highway through the gaping space in the centre of the city. I recall the pride with which moulders in the *Bolshevik* works told me that the first job the rebuilt shop had done was to cast lamp standards for the new Kreshchatik. Trees were planted, broad pavements laid, and at once the people of Kiev resumed their traditional evening promenade, though then there were no shop windows to look at, no cafés to dawdle in, and only an occasional lorry filled with rubble to use the splendid road. Some of those who walked were, perhaps, thinking mainly of the past, for many *Kievliani* perished in the war; but the mood I sensed in those days was predominantly hopeful.

Meanwhile the architects were planning the rebuilding of the street frontage. Vlassov, at that time chief city architect, told us something of the problems they faced. The new Kreshchatik was to be less street than forum, the spacious city centre that a Socialist capital requires. A national style? Yes, but that did not mean a slavish revival of Kiev medieval or Ukrainian baroque. It was necessary to look to the Ukrainian village where the *khatas*, built by the peasants themselves, could provide many clues to the national style. White was the colour the Ukrainian peasant favoured for his cottage walls inside and out, white was his shirt and white were the blouse and kerchief his wife and daughters wore, though to cottage-wall and shirt and blouse they applied

floral decoration or embroidery. So why should not the new Kreshchatik be white in this new smokeless Kiev, why should not the new building-components industry make ceramic blocks and tiles with moulded ornament, instead of the drab grey facings that had been used on the new public buildings—so inappropriately squat and cubic in a city which cries out for light, fanciful buildings to lift their tops over the abundant foliage?

The new Kreshchatik fulfils Vlassov's ideas: the street gives an immediate impression of brightness and individual character lacking in most pre-war buildings, especially in Moscow; and in a way this throws an interesting new light on the national character of their style; it is linked with the baroque and rococo of old Kiev, and forces the worthless buildings of the nineteenth-century back into obscurity.

This transformation of Kiev has been helped by the praiseworthy attention the city architects have given to what remains of old Kiev. Sancta Sophia has regained the splendour this mother of Russian churches deserves. Inside, the mosaics and mural paintings are being meticulously restored, the process usually meaning the stripping of previous tasteless " restorations " and the uncovering of work as valuable to Byzantologists as to students of early Russian painting both religious and secular. The great Pantokrator within the central dome, and the Virgin Orans in the semi-dome of the apse, with their attendant figures, are now fully visible; and though when we visited Sancta Sophia scaffolding was masking most of the fresco mural painting, we were permitted to see how thorough and painstaking the work is. In a wing of the cathedral we found beautifully hung the remains of mosaics and frescoes removed from the Church of St. Michael with the Golden Roof. These works, which were removed to Germany during the second world war, were brought back to Kiev a few years ago, and offer the student of medieval painting a most valuable clue to eleventh-century painting.

Sancta Sophia is a state museum, and is attracting several hundred visitors a day. We were impressed by the sense of reverence with which excursionists, many of them peasants, visited the cathedral, as well as by the earnest way they listened to the guides. We had already seen some of the visitors in the caves of the Crypt Monastery, to which the festival of Spas—a date in the religious calendar corresponding to the French Mi-Août (A la mi-août l'hiver se noue) and, in some degree, to the harvest festivals of Britain—had brought many believers carrying dry poppy pods; and there too it was interesting to note how respectful the sightseers were as they waited in the catacombs while the believers stooped to kiss the glass covers over the mummified remains of ascetic monks or joined in harmonious hymns in the chapels carved out of the clay of the Dnieper's steep banks. True, up above in the breezes sweeping across the river, a state museum explains in convincingly scientific terms the process of mummification and the origin of man (" fifth-form stuff " said our schoolgirl companion); but a scientific attitude towards natural phenomena does not prevent the average young Ukrainian, visiting the catacombs out of curiosity or " for a lark ", from maintaining a courteous and tolerant attitude to those who go there for different reasons. Only occasionally did one hear a monk—there are about seventy-five of them at the monastery—ask a young man to remove his cap (" Remember where you are ").

The festive mood which we found Kiev enjoying must have had something to do with the harvest. Though Semyon Khazan, the chairman of the Stalin *kolkhoz* (collective farm) which we visited one day, would not go so far as to describe it as bumper (" Better than average " was his estimate, but he has held his post twenty-three years and, no doubt, has learned to be cautious), our frequent inquiries along the country roads were always answered by a broad smile and an emphatic " *Karno* " (" Good "). The Stalin kolkhoz was

distributing a basic four kilograms of grain and seven roubles per work-day to its members, with additional bonuses in vegetables, milk, meat and poultry to teams which had overfilled their quotas of work. And in many farmyards of the Poltava region we saw women with hand-flails threshing the advances in grain which had already been distributed. Due attention, too, we found, was being paid to fodder crops. The feathery panicles of maize waved beyond the staring sunflowers along many stretches of road. In the Moscow region, where it is grown mainly for ensilage, it was knee high, for the summer came late, but in the Ukraine the plants often rose higher than the kerchiefed heads of the peasant women.

It is, perhaps, too early to write with confidence of the effects of the new course in agriculture. In this respect, too, farmer Khazan was cautious. He showed us an impressive amount of mechanical installations, the new village club which was being built, a few new cottages; but he added: "We need five years' steady progress. Given that we shall be able to rebuild the entire village."

In Kiev, more strongly than in any other Soviet city I know, one has the feeling of urban and rural development advancing side by side. Perhaps the architects have a hand in this, by building in the way Vlassov suggested; perhaps it is because one has only to climb a flight of steps from the Kreshchatik, and stand below the Vladimir monument, to look across the placid Dnieper to the rolling steppes. The changes that have industrialised the Soviet Union have cut deeply into every side of Ukrainian life, but there are ample signs in Kiev that the relations between a healthy agriculture and prosperous city life are fully understood. Unlike Moscow, Kiev did not need an agricultural exhibition to bring home to its people the way their fate is linked with the state of affairs on the land.

As we drove along the Kreshchatik for the last time, and took the Dnieper embankment to reach the flyover that leads to the new bridge below the Crypt Monastery, I remembered the words of a building worker in Stalingrad, words applicable to Kiev too: "The best war memorial we can build is a city that expresses the joy our people feel in being able to live in peace." At the bridgehead we passed a poster. It showed a mother, her arms raised in an antique gesture, and it bore the word "Peace". It seemed an appropriate modern symbol for the city in whose most ancient building another Mother raises her arms in intercession for the salvation of mankind. And as we drove eastward the gleam of the gold on Sancta Sophia was taken up by a thousand threshing floors, so that the whole steppe seemed to be aglow.

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Book Reviews

PRAISE AND CRITICISM

I Went to Moscow. Mervyn Stockwood (Epworth Press, 15/-).

PETER Townsend, in a letter to the *Church Times* about a review of his book *China Phœnix*, says: "We are still too prone to interpret China . . . in our own terms without first understanding theirs." This same attitude towards an assessment of the Soviet Union holds good of Canon Stockwood's *I Went to Moscow*. He seems to have viewed the Moscow scene through the spectacles of a "bourgeois parson"—a character he accuses his Soviet friends of attributing to him. This causes a certain irritability and impatience to affect his judgment. The whole system is so much the reverse of our own that on encountering it at source for the first time one must be prepared to jettison every preconceived idea and turn one's scale of values upside down.

Thus, the Canon finds it difficult to believe in the altruism of a Soviet worker. Yet when you consider that it is by his own effort he obtains a progressively higher standard of living, then it becomes just plain common sense. It is rather difficult to follow the writer's line of thought which compares Stakhanovism to "sweated labour"; but then he probably dislikes the western version, i.e. "time and motion" studies, or the television system—from the bench to the manager's office!

Canon Stockwood's interview with the Patriarch was most enjoyable, and I have not ceased to admire the temerity of his questions and the frankness and urbanity of His Holiness's replies. Let us sincerely hope that His Grace the Archbishop of Canterbury and the Patriarch do eventually meet, for there seems little difference between the Russian Orthodox Church and our own Church of England if she were disestablished.

The writer's *English Reader for Class* 9 experience should not have angered him quite so much. The assessment of the writers Dickens, Burns, Byron and so on, in the book seemed reasonable enough; and if the Soviet teachers are reluctant to explain the improvements since the times of the writers they are not the only teachers in the world who are so remiss. As I read this part of the book I was reminded of the anti-Soviet cartoons, comic strips, and so on, that I have seen, and rejoiced that at this year's World Assembly for Peace part of the final resolution was that the teaching of history and literature throughout the world should be more objective and unbiased.

Canon Stockwood frequently uses the term "fellow traveller", and sometimes with a prefix such as "purblind", so implying that such a one is mentally limited and easily beguiled. On the other hand, he himself often seems to have the truth hid from his eyes by sheer denial. St. Thomas was not a fellow traveller, but was finally convinced.

Canon Stockwood's book is so full of interesting points and criticisms that in a short review it is an impossible task to do it justice. But it is a joy to join with him in his praises. He greatly appreciates the Soviet theatre (apart from propaganda pieces!), their care and love of children and the aged (although he was humorously cynical about the régime making people prematurely aged), and their great strides in agriculture from which we can learn. Above all, perhaps we enjoy his unstinted praise of his guide and of the good humour and courtesy he met on all sides.

I was accused, after a similar recent visit to Moscow, of viewing the scene through rose-tinted spectacles. Perhaps our differences are caused by opposing interpretations of the same scene. I certainly was not "too prompt to interpret the Soviet Union in our own terms before first understanding theirs".

ALEX. McGOVERN,
Vicar of Tockwith, Yorks.

VALUABLE WORK ON SLAVONIC LANGUAGES

Slavic Languages, A Condensed Survey. Roman Jakobson (King's Crown Press and Geoffrey Cumberlege, 6/6).

THE leading Slavonic philologist outside the USSR has added to the invaluable series *Columbia Slavic Studies* a masterly little work which will be immensely useful alike to the specialist and to the amateur of Slavonic studies. He has included sections on the distribution of the languages, the developments from Primitive Slavonic, and the history of the literary languages. There follow sketches of comparative phonology and comparative grammar. But the most valuable part of the book—since such sketches are too brief to satisfy everyone—is the

bibliography (pp. 22-36). This manages amazingly well to cover the most useful section of books on every aspect of Slavonic languages, collectively and individually, including works in English where these exist.

To the above is added a useful map showing the approximate distribution of the Slavonic languages today; and on pp. 12 and 13 all are illustrated by means of giving one gospel sentence as it appears in each. Perhaps the omission that will strike the specialist most is that of all periodicals. In particular, those who seek to follow the latest trends in linguistic theory in the USSR might expect a mention of *Voprosy Yazykoznaniya* ("Questions of Linguistic Science") now edited by Professor Vinogradov.

C. L. WRENN.

TREASURE FOR PHONETICIANS

Russian Pronunciation and Russian Phonetic Reader. S. C. Boyanus (Lund Humphries, 40/-).

FOR those students of modern Russian who already have a knowledge of phonetics, and who appreciate the indispensable usefulness of phonetic-alphabet transcription for speeding up the recognition and acquisition of those details of pronunciation that make all the difference in "speaking like a native", this small but beautifully compact work will be a treasure. Its purpose is to facilitate rapidity and accuracy in hearing and reproducing the spoken language, and it conforms meticulously to Maupassant's rule for story writers—"everything that is necessary and nothing that is not".

Those who have no basic phonetic training, however, should acquire at least the elements of a phonetic approach before tackling it. If they do, and if their object is oral fluency and "Russianness" of speech, they will be rewarded.

In this book the late Professor Boyanus has left a fitting memorial, and those of his pupils who saw the work through the press—its technical production is masterly—have made of it a worthy tribute to him and to his late wife, Lilias Armstrong. All who were ever fortunate enough to be in their classes will always remember them both with gratitude as inspired teachers.

S.J.

POST-MORTEM

History of the Cold War. Kenneth Ingram (Darwen Finlayson, 15/-).

OBVIOUSLY no one will agree with all the judgments of this study of the relations between the powers in the period 1945 to 1953; but within its limitations this is a very useful survey, which attempts to give both sides of the various controversies and "situations" which have divided east and west since the end of the war. The limits which the author has imposed do not allow us to see the mechanics of the "cold war" as waged in the daily press, nor do we obtain any insight into the psychological aspects. The history is confined almost entirely to the formal, political developments within a framework of "objectivity" which entails presenting the arguments for either side without any attempt at a radical judgment. The author attempts to overcome this "objectivism" in a final chapter, in which he appears to suggest that the whole thing was a mistake anyway.

The main value of this book—a value which should not be minimised—is that it compensates, however belatedly, for the veil of silence which was thrown over the Soviet view on most of the questions it discusses by the British popular press; and also that Mr. Ingram attempts, and in considerable measure succeeds in, the difficult task of presenting a reasoned and unbiased history of the period under review. The usefulness to students of international affairs is that it gives the skeleton of the past: it lacks the circumstantial detail and the kind of analysis which would give a real insight into the events and policies of the "cold war". Even in spite of these defects, it is crystal-clear from Mr. Ingram's narrative and summing-up that the "cold war" powers, in so far as their policy was based on fears of Soviet aggression and "intelligence" reports of the level of Soviet armament, were both misinformed and guilty of illogical thinking.

This book is recommended reading for all anti-Soviet persons.

J. McLEISH.

PUBLICATIONS RECEIVED

ANTHOLOGY OF OLD RUSSIAN LITERATURE. Ed. A. Stender-Petersen and S. Congrat-Butlar. (*Columbia University Press* and *Geoffrey Cumberlege*, 68/-.)

BEES. I. Khalifman. (*Central Books*, 7/6.)

HERALD OF PEACE, The, April/June, 1955. (*International Peace Society*, 4d.)

HISTORY OF RUSSIA, A. Sir Bernard Pares. r.e. (*Jonathan Cape*, 30/-.)

I WENT TO MOSCOW. Mervyn Stockwood. (*Epworth Press*, 15/-.)

NINTH WAVE, The. Ilya Ehrenburg. (*Lawrence & Wishart*, 12/6.)

OPEN BOOK. V. Kaverin. (*Lawrence & Wishart*, 12/6.)

PEACEFUL USES OF ATOMIC ENERGY. (*Association of Scientific Workers*, 6d.)

RUDIN. Ivan Turgenev. (*Columbia University Press* and *Geoffrey Cumberlege*, 28/-.)

RUSSIAN CHURCH TODAY, THE. S. G. Evans. (*Religion and the People*, 6d.)

SCIENCE FOR PEACE, September 1955.

SCIENCE NEWS. (*Penguin Books*, 2/6.)

SOVIET STUDIES, VII, 1, July 1955. (*Basil Blackwell*, 9/-.)

TREES. Vol. 18, No. 4. (*Man of the Trees*, 2/-.)

WORKS, Vols. 12 and 13. J. V. Stalin. (*Lawrence & Wishart*, 5/- each.)

SCR Events

November—December 1955

Dance. November 5.

Lecture. **Art Galleries and Museums in USSR. G. Bemrose (Curator, Stoke Art Gallery).** November 10.

Lecture and Film. **Soviet Psychology Today.** November 11.

Lantern Lecture. **Impressions of USSR. Prof. C. F. Wagner.** November 25.

Science Symposium. **Acad. Tsitsin on Agriculture. Prof. C. F. Powell on Atomic Energy. Dr. S. Lilley on Automation. Photographic illustrations by J. Allan Cash. At the Caxton Hall.** November 29.

Lecture. **Soviet Medicine.** December 2.

Dance. December 3.

Lecture. **Soviet Education, Miss D. Levin. At the College of Preceptors.** December 6.

Annual General Meeting; and SCR Dinner **(at the House of Commons, by courtesy of Dr. Barnett Stross, M.P.).** December 10.

Musical Entertainment **(by children for children). "St. Petersburg Fair."** December 17.

New Year's Eve Dance. December 31.

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This service can be of great value to club secretaries and organisers in preparing their winter programmes. For further information and details, please write to the Hon. Secretary, Society for Cultural Relations with the USSR, 14 Kensington Square, London, W.8.

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